The Mind's Eye on Personal Profiles

How to inform trustworthiness assessments in virtual project teams

Ellen Rusman

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How to inform trustworthiness assessments in virtual project teams

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Contents

Chapter 1

General introduction

> '*Trust is the lubrication that makes it possible for organizations to work.*'
> (Bennis & Nanus, 1985, p.43)

'Virtueel samenwerken is lastig', in translation 'Virtual collaboration is hard'. Just a heading of a short article published in the Dutch journal Computable in June 2001. The article continues with the statement that 'normal human contact remains necessary to create a positive work climate' and summarizes findings of a study carried out by Twijnstra (a large consultancy company) and the University of Nijmegen among several well-known multinationals, such as Shell, Ahold, Unilever and Heineken. The most important findings are that a virtual setting eliminates any coincidental and spontaneous communication, and that one of the most difficult issues in a virtual team is interpersonal trust building. Therefore, the report says, face-to-face meetings remain essential, especially a well-organized kick-off. This kick-off should pay considerable attention to getting to know each other and to establishing common values among team members.

From the perspective of the present thesis, the article's most notable proposition is that interpersonal trust in virtual project teams only comes about through face-to-face meetings. These types of meetings allow the spontaneous communication essential to get to know each other. Although this proposition sounds plausible at face value, it does not tell us why this spontaneous communication is so important. We are not told what information colleagues in virtual project teams exchange during their informal interactions and why especially the information that is allegedly exchanged is important to get to know each other, to assess each others trustworthiness and thereby helps to build trust. In spite of the face validity of the claim, we actually do not know what information is the most meaningful for trustworthiness assessments; and therefore we do not know whether methods other than a face-to-face meeting could be used as an alternative to exchange this information.

Several educational and training programmes, especially in the United States, bracket together an abundance of antecedents of trustworthiness and trustworthy behaviour, such as honesty, loyalty, reliability and integrity (WiseSkills, 2001; CharacterCounts, 2009). Although jointly mentioned in these programmes, most scientific research has been done on separate, small clusters of trustworthiness antecedents. Many antecedents are mentioned in a variety of scientific publications related to interpersonal trust or trustworthiness. However, this research predominately targeted private settings, and did not investigate the antecedents jointly. What little research has been done in professional settings starts from the tripod model of Mayer, Davis and Schoorman (1995), which consists of ability, benevolence and integrity. Only very few studies relate trustworthiness antecedents to the

kind of specific information or behaviour of employees that can function as a signal of trustworthiness (Riegelsberger, 2005; Six, Nooteboom & Hoogendoorn, 2010).

Almost 10 years after the publication of the above-mentioned article in Computable little has changed. We still grope in the dark about what information is needed during the initial moments of interaction between virtual project team members, about why this information is important, about what cognitive needs it fulfils, and about which information is especially useful when deriving a trustworthiness assessment. Companies and groupware support systems still provide ice-breaking activities and profiles to virtual project teams based on their best guesses, for lack of informed design guidelines.

And yet virtual teams are deployed increasingly, as they potentially provide various advantages, such as having access to uncommon expertise or highly-skilled work forces, reduction of accommodation and travel expenses, efficiency in spent hours, absence of jet-lags and flexibility in terms of the size of the work force, working hours and location (Ebrahim, Ahmed & Taha, 2009; Pillis & Furumo, 2007). But, in order to benefit from these potential advantages, these teams should 'work', which they do not always do. In many cases, it seems, problems can (at least partly) be attributed to an impaired process of interpersonal trust formation (Brown, 2000; Corbitt et al., 2004; Dignum & Van Eijk, 2005; Furumo & Pearson, 2006; Jarvenpaa et al., 1998; Walther, 2005).

One of the factors crucially influencing the formation of interpersonal trust is the perceived trustworthiness of others. Perceived trustworthiness is an individual's assessment of how much and for what type of performance a trustee can be trusted - a trustee being the person whom one considers to trust (Hardin, 2002). Trustors assess trustworthiness on the basis of the perceived trust warranting properties of a trustee (Goffman, 1959; Macrae & Bodenhausen, 2001). These trust warranting properties are estimated on the basis of information trustors perceive or information they receive from others. These pieces of information are called 'signs' and 'signals' (Bacharach & Gambetta, 1997; Donath, 2006). When signs and signals are interpreted by the receiver, using a schema with trustworthiness antecedents, they become cues for certain trust warranting properties of others; put differently, they become part of the cognitive model the trustor has of a trustee in a trust requiring situation (Castelfranchi & Falcone, 1999; Gambetta, 1988). For example, an academic title such as 'professor' (signal) could become a cue for the trustworthiness antecedent 'ability', and can lead to the attribution of the trust-warranting property 'able' for this specific person. The very same signal could also function as a cue for the trustworthiness antecedent 'persistence', leading to the attribution of another

trust warranting property, to wit, one that makes this person very persistent in the eyes of the other.

In face-to-face encounters people construct a cognitive model of others on the basis of the different types of signs and signals they receive through a variety of routes (Hung, Dennis, & Robert, 2004). In virtual project teams, however, team members have less or a different type of information available to make evaluations of the trustworthiness of others. Signals that are naturally available in a face-to-face setting are not naturally present in mediated settings (Donath, 2006; Jacobson, 1999; Lee, Ang, & Dubbelaar, 2004; Riegelsberger, 2005; Wood & Smith, 2001), due to the separation in space and time of the people involved, and the mediated character of the communication. Crucially, people are known to form initial impressions of others at all times, independently of whether or not they have enough information available (Postmes, Haslam, & Swaab, 2005; Walther, 2005). All observations done after the initial contact are coloured by this first perception. Indeed, people even avoid searching for disconfirming information (Good & Gambetta, 1988; Petty & Cacioppo, 1986; Robert, Dennis, & Hung, 2009). Therefore, the initial perception of trustworthiness one has of others largely determines the type of interaction people subsequently have within virtual project teams.

This thesis addresses the gaps in our knowledge of trustworthiness assessments in the initial phases of virtual project team collaboration. It does so in terms of information needs as well as antecedents of trustworthiness. Were we to know what information virtual team members need to assess trustworthiness, that information could be used to guide the design of, among other things, training related to trust and trustworthiness, ice-breaking activities and profiles in collaborative environments. Until now, few researchers have explored and related antecedents of trustworthiness to information which is or could be displayed in virtual environments. What has been done, looks at economic contexts of branding, product identity, online markets (Benesch, 2000; Donath, 2006; Lee et al., 2004; Wood & Smith, 2001).

To redress this balance, this thesis addresses the following research question:

> *How to inform trustworthiness assessments of virtual project team members in the initial phase of collaboration?*

Scope

This thesis does not consider trustworthiness in private settings, although it is quite likely that private and public settings overlap in the trustworthiness antecedents they require. We also restrict our research to virtual project teams. A virtual project team is here defined as a group that cuts across spatial, temporal, cultural and/or organizational boundaries; that is assembled on an as needed basis for the duration of a project; the project team members of which use ICT to facilitate communication and are mutually dependent on each other (Jarvenpaa & Leidner, 1998; Hung et al., 2004; Powell et al., 2004; Sloep, 2009). Furthermore, in most cases team members rarely see each other in person and do not have a prior history of working together. The thesis, then, focuses on pairs of virtual team members (a dyadic, interpersonal relation), who stand to each other in non-hierarchical, symmetric relations. Thus, professional trustworthiness between a project leader and a project team member is out of scope. The trustworthiness of the group as a whole and the overall trust within a virtual project team are not addressed here either.

Trustworthiness assessment in virtual teams is different than in more open forms of mediated social interaction (communities, social networks). One important difference is that in virtual teams the identity of a member is known by the organisation to which he or she belongs. Identity fraud and the use of multiple identities are therefore unlikely, as there supposedly is a large degree of social control. This also makes it implausible that people lie when disclosing information. Lying may even have potentially severe consequences, such as forced resignation. Other differences are that only team members are jointly accountable for the achievements of predetermined goals and results; they are bound by formal structures and explicit agreements, and in many cases they are led by a group leader (McDermott, 1999, Wenger & Snijder, 2000). In contrast, members of self-organised communities and social networks, participate voluntarily, are not jointly accountable for results, and hardly plan results in advance; rather, results emerge more or less in these contexts. In communities and social networks people are more likely to experiment with multiple identities, as there is little social control and few if any negative consequences of doing so. Because of these differences between both kinds of online environments, one should be cautious when transferring results acquired in the context of virtual project teams to the context of communities and social networks.

Research questions

To help answer the main research question - How to inform trustworthiness assessments of virtual project team members in the initial phase of collaboration? - five subordinate research questions were posed:

1. How is interpersonal trust formed in face-to-face teams? Do virtual project teams differ in this respect from face-to-face teams?
2. What antecedents of trustworthiness do professionals use to assess their colleagues' trustworthiness?
3. Can a profile be used to facilitate trustworthiness assessments? How do trustors/trustees value such profiles?
4. Which information elements do trustors in virtual project teams commonly prefer to have available in a profile to assess a trustees trustworthiness?
5. Do trustors prefer information elements because they provide them with cues for specific trust-warranting properties?

The answers to these questions should enable the identification of a concise set of information elements that inform professional trustworthiness assessments in virtual project teams.

In each chapter of this thesis we address one or two research questions. The questions do not map one-to-one to a chapter. The next section describes how the content of each of the chapters relates to the research questions.

Research approach and outline of the thesis

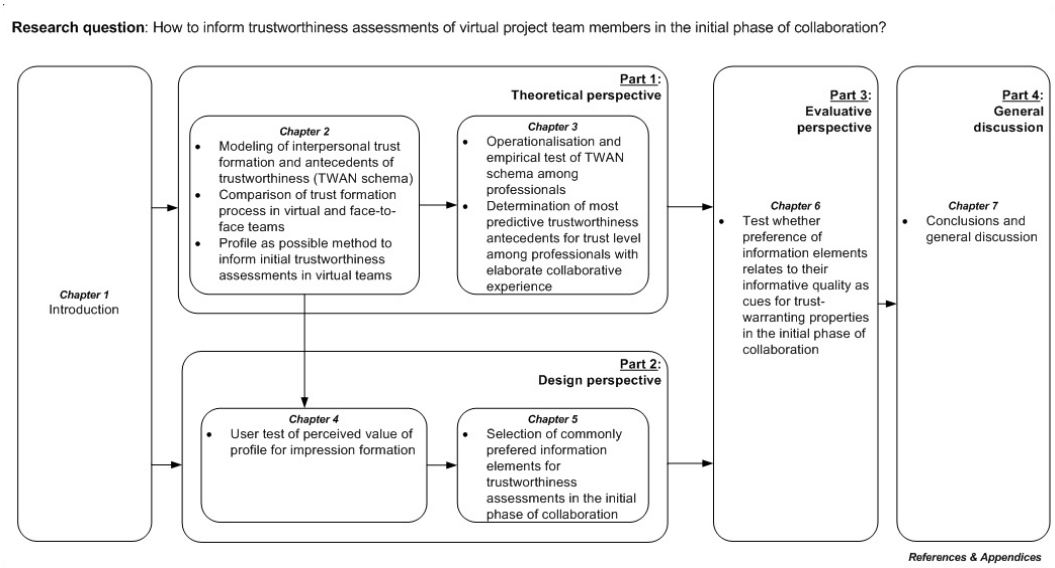

Figure 1.1. Overview of thesis structure

Figure 1.1 presents an overview of the content and relations between the chapters of this thesis. The thesis consists of four parts, each containing one or two chapters. The first part is theoretical, the second design-oriented and the third part evaluative in nature. The fourth part contains the conclusions which can be drawn from the studies, as well as a discussion of the results and directions for future research.

Part 1: Theoretical background

The theoretical part of this thesis aims to provide insight in the process of interpersonal trust formation in virtual project teams. It studies the antecedents of a cognitive model of perceived trustworthiness in a professional context. This research does not start from scratch. Interpersonal trust and trustworthiness have been subjects of interdisciplinary research, predominately in the domains of psychology, sociology, organizational science and, more recently, also in computer science. Research reported in this thesis builds on the results acquired in these domains.

Chapter 2 reports the results of a literature study. It derives a model for the formation of interpersonal trust between project team members, collects insight in the role of perceived professional trustworthiness herein and develops a first version of a schema for the antecedents of perceived pro-

fessional trustworthiness (research questions 1 and 2), called the Trust-WorthinessANtecedent schema (TWAN). Furthermore, an approach to support initial trustworthiness assessments in virtual project teams is proposed.

Chapter 3 describes the operationalisation and empirical test of the proposed TWAN schema through a scale to measure the antecedents of perceived professional trustworthiness (for ease of exposition in this thesis abbreviated as a measure of perceived professional trustworthiness). The study determines whether the TWAN schema holds in practice by questioning a large group of professionals on their perceived trustworthiness of colleagues within a specific team (research question 2). Validity and reliability analyses of the scales are made, as well as a multiple-regression analysis to determine concurrent validity of the antecedents with a general value of interpersonal trust.

Part 2: Design

The design-oriented part of this thesis aims to determine if virtual project team members benefit from having a profile with information elements available to inform their initial trustworthiness assessments.

Chapter 4 reports the results of a case study of interdisciplinary virtual project teams carried out in the context of the European Virtual Seminar on Sustainable Development (EVS). Using questionnaires and semi-structured telephone interviews, experiences with a profile template for initial trustworthiness assessments were reported, with the aim to explore whether team members would value this type of support (research question 3).

Chapter 5 describes a field study. It aims to determine which information elements are commonly perceived as important to inform initial trustworthiness assessments as well as are practical to support collaboration (research question 4). This field study was carried out among Belgium bachelor students with virtual project team experience. Based on an analysis of profiles used within different trust-requiring mediated environments, a structured questionnaire was used to determine common information element preferences.

Part 3: Evaluation

The evaluative part of this thesis explores whether commonly preferred information elements do indeed function as cues for the perceived professional trustworthiness antecedents.

Chapter 6 studies why trustors with virtual project team experience prefer certain information elements in their attempts to decide on a trustee's trustworthiness. The study explores whether certain information elements are more informative to judge professional trustworthiness than others (research question 5). This field study was also carried out among Belgium bachelor students with virtual project team experience. A semi-structured questionnaire and qualitative approach of data analysis with a coding scheme were used to explore possible relations between information elements and professional trustworthiness antecedents.

Part 4: Conclusions and general discussion

Chapter 7 summarises the results, derives the central conclusions from the studies and reflects on the contribution of this thesis to the research domain of interpersonal trust and trustworthiness in general. Additionally, the chapter provides a general discussion of the limitations and boundaries of the studies, their practical relevance, transferability and implications. A preview of possible future research is given.

The **Appendices** contain (a selection of the most important parts of) the materials used within the studies reported in this thesis: the measurement instrument, questionnaires, telephone interviews, coding schemes and accompanying instructions. The material in the appendices is referenced to in the various chapters of the thesis.

Chapter 2

Fostering trust in virtual project teams: Towards a design framework grounded in a TrustWorthiness ANtecedents (TWAN) schema

Rusman, E., Van Bruggen, J., Sloep, P., Koper, R. (2010). Fostering trust in virtual project teams: Towards a design framework grounded in a TrustWorthiness Antecedents (TWAN) schema. *International Journal of Human-Computer Studies, 68(11)*, 834-850.

Abstract

Several collaboration problems in virtual project teams that work in knowledge-intensive contexts can be attributed to a hampered process of interpersonal trust formation. Solutions to trust formation problems need to be based on an understanding of how interpersonal trust forms in face-to-face project teams as well as on insight into how this process differs in virtual teams. Synthesizing literature from various disciplines, we propose a model for the formation of interpersonal trust between project team members. Taking this model as a starting point, we analyse how virtual settings may alter or even obstruct the process of trust formation. One method to improve the formation of interpersonal trust in virtual settings is to facilitate the assessment of trustworthiness. This can be done by making information available about individual virtual project team members. Previous research in virtual project teams focussed principally on the medium by which information is spread, for example, by phone, mail, or videoconferencing. Most researchers failed to take the specific content of the information into account, although there is general agreement that personal, non-task-related information is important to foster trust. For this, we propose to use the antecedents of trustworthiness, which until now have mainly been used as a framework to measure trust, as a design framework instead. This framework of antecedents can also be used to determine which type of information is relevant to assess each other's trustworthiness. We review existing literature on the antecedents of trustworthiness and extend the well-accepted antecedents of 'ability', 'benevolence' and 'integrity' with several other antecedents, such as 'communality' and 'accountability'. Together, these form the TrustWorthiness ANtecedents (TWAN) schema. We describe how these antecedents can be used to determine which information is relevant for team members assessing others' trustworthiness. In future research we will first verify this extended cognitive schema of trustworthiness (TWAN) empirically and then apply it to the design of artefacts or guidelines, such as a personal identity profile to support the assessment of trustworthiness in virtual project teams.

'Trust is an assent of the mind and a consent of the heart' (E.T. Hiscox)

1. Introduction

Interpersonal trust is one of the key factors influencing the performance of face-to-face as well as virtual project teams (Beer et al., 2003; Brown, 2000; Corbitt et al., 2004; Dignum & Van Eijk, 2005; Furumo & Pearson, 2006; Gambetta, 1988; Jarvenpaa et al., 1998; Raes et al., 2006; Walther, 1995, 2005). When little or no trust exists within a team, serious collaboration problems may occur, such as poor decision-making, hampered information exchange, an increased risk of misunderstandings and mounting personal conflicts (Häkkinen, 2004; Hartman, 1999). Research indicates that in virtual project teams, which use ICT as their dominant means of communication, interpersonal trust often develops more slowly than in face-to- face project teams (Jarvenpaa & Leidner, 1998; Wilson et al., 2006). Furthermore, this trust is frequently fragile and easily damaged (Bos et al., 2002; Hung et al., 2004; Wilson et al., 2006; Zolin et al., 2003).

Although researchers from different disciplines have devoted considerable effort to developing and testing models of interpersonal trust (Butler, 1991; Deutsch & Jones, 1962; Gambetta, 1988; Marsh, 1994), an integrative view of the whole trust formation process of project teams is still rare, and a comparison with the situation in virtual project teams in order to pinpoint problems in the latter is lacking (Riegelsberger et al., 2004). This article aims to fill these gaps. It is important to look specifically at trust formation problems in virtual project teams in the light of the increasing frequency of this format. A recent study by the Institute for Corporate Productivity (I4CP) found that 62% of 278 interviewed companies consider a virtual team as an increasingly important format for collaboration and in companies with more than 10,000 employees this percentage rises to 80% (Perry, 2008). Virtual teams vary along a number of dimensions, such as team size, degree of geographic dispersion, prior shared work experience, nature of members' assignment, cultural diversity (national, organizational and/or professional) and expectations of a common future (Dubé & Paré, 2004). Seventy-seven percent of the companies in the I4CP study indicated that virtual teams are most frequently used to support special one-time projects.

In this article we focus on this type of virtual project teams. We further characterize this type of virtual project teams as assembled on an as-needed basis for the duration of a project and staffed by two or more members across spatial, temporal, cultural and/or organizational boundaries (Hung et al., 2004; Powell et al., 2004). In this type of virtual team, team members sporadically meet in person, communicate via ICT (e.g., email, chat, videoconferencing), often do not have a prior history of

working together (Jarvenpaa & Leidner, 1998), and may never meet in the future (Hung et al., 2004). Teams with these characteristics are also called global virtual project teams (Dubé and Paré, 2004). This type of team is reported to have most problems with interpersonal trust formation, especially in the initial phases of the project (Jarvenpaa & Leidner, 1998; Zolin et al., 2004; Zolin et al., 2002). For example, as chances of reciprocity are lower due to the expectation of not having future encounters, people have fewer incentives to behave in a trustworthy manner. Moreover, when collaboration is between organizations, people are less likely to have access to reputational information, which could help them to form a first impression of the trustworthiness of their team mates. Many EU-funded and corporate, knowledge intensive projects operate as virtual teams, for example for joint software design and development, problem solving task forces, or customer services (Hertel et al., 2005). Global virtual teams are also often deployed for new 'international market' product development (MCDonough et al., 2001).

Examples of the global virtual project teams we envisage are those formed within the European project European Virtual Seminar on Sustainable Development (EVS)(Cörvers et al., 2007; Rusman et al., 2009). In the EVS, team members from different universities across Europe collaborate to solve cross-border sustainable development problems. During a period of almost five months they work on a case in groups of four to six team members with different nationalities and from different disciplines. They do not have prior joint work experience and they only work together part-time and for the duration of the project. The result is a report that presents advice to solve the sustainable development problems in the case in question. Another example, in the corporate organization of a large multinational firm (ABC), is described by Dubé and Paré (2004). Six team members who had no prior shared work experience and came from five countries around the world were assigned, to give recommendations for a new security training programme, based on their top expertise within different domains. Team members were assigned on a part-time basis for the duration of the project and the team dissolved after twelve months. Although people were employees of the same organization and could probably have access to reputational information, top executives requested that the project should start with a face-to-face kickoff meeting to get to know each other. In the rest of this article we use the term 'virtual project team' to refer to the ad hoc, temporary types of teams described above.

Many virtual project teams find collaboration problematic (Häkkinen, 2004; Trautsch, 2003). There are several problems that may be encountered. First, communication may not be spread equally in time. In this case team members often communicate sporadically in the initial phases of the project but, when facing the 'deadline', can become victims of communication overload. Second, people may just be exchanging bits of information without building on each other's knowledge, thus failing to take their group to the level of collaborative knowledge construction.

A third potential problem is the low frequency and unequal spread of interaction between team members, thus impeding full profit from each person's personal qualities and expertise. A fourth problem that may occur is 'flaming' (online name-calling), personal conflicts and enduring misunderstandings between group members. Finally, overall group performance could be of low quality, with decision-making processes being hampered, so that the group's deliverable is of low quality or late. Research suggests that a hampered process of interpersonal trust formation can cause several of these problems (Beer et al., 2003; Brown, 2000; Corbitt et al., 2004; Dignum & Van Eijk, 2005; Furumo & Pearson, 2006; Gambetta, 1988; Jarvenpaa et al., 1998; Raes et al., 2006; Walther, 2005).

In this article we seek to explain why virtual project teams develop interpersonal trust in a different way compared with face-to-face teams. To do so, we present a model of interpersonal trust formation in face-to-face project teams, which is grounded in contemporary research on interpersonal trust, and indicate where virtual project teams deviate from their face-to-face counterparts. By comparing these settings, we identify the sources that impede interpersonal trust formation in virtual project teams. We propose a strategy to prevent problems in trust formation. We identify the factors that accelerate the formation of trust as well as those that lead to more solid forms of trust (Hung et al., 2004). One key factor influencing interpersonal trust is the perceived trustworthiness of project team members. We argue that virtual project teams often lack the specific information required to form a cognitive model of each other's trustworthiness. Members of virtual teams need signals which they can interpret to determine whether they perceive a team member as trustworthy.

The concept that availability of personal information positively influences the level of interpersonal trust in teams is not new. This is evidenced by the abundance of companies offering team building programmes for project teams. Research too has paid attention to the effects of icebreaking activities and of the use of different media (e.g., videoconferencing, audioconferencing, text) on trust within virtual project teams (Bos et al., 2002; Olson & Olson, 2000a,b). In all these settings, it remains unclear what type of information specifically helps project team members who are trying to assess the trustworthiness of their colleagues. Trustors try to acquire information which matches the antecedents in their cognitive schema for trustworthiness. To determine what type of information is most relevant, one should know what these antecedents are. It is a novel notion that interpersonal trust formation in virtual project teams can be fostered by making specific personal information available that is grounded in a cognitive schema of perceived trustworthiness. We revisit previously defined antecedents of trustworthiness to see whether they can be specified and elaborated, in order to serve the prescriptive design-oriented function. We present the result in the TrustWorthiness ANtecedents (TWAN) schema and provide an example of how this schema, once it is em-

pirically validated with professionals, can be used to guide design decisions. This schema should be considered as a first step in the development of a design framework, which can be used to determine which type of personal information is most relevant for (virtual) team members to have available.
Hence, in this article we successively answer the following questions:

- What is interpersonal trust?
- How is interpersonal trust formed in professional, knowledge-intense projects where people meet face-to-face?
- Is interpersonal trust formed in a similar way in virtual project teams; what are the differences and what problems occur?
- How can we mitigate problems in the formation of interpersonal trust in virtual project teams?
- Which antecedents are used for the assessment of trustworthiness of professional team members?
- How can we exploit these antecedents to design artefacts and guidelines that foster interpersonal trust in virtual project teams?

2. Interpersonal trust formation in project teams: a model

2.1. Trust: understanding the concept

Trust is a multidimensional and complex construct that is studied in different disciplines, such as psychology, sociology, economics, philosophy, and more recently, computer science. These disciplines have developed their definitions and understanding in parallel. In recent work, however, multi-disciplinary conceptualizations converge toward an interpersonal connotation of the concept: trust as 'a social tie from one actor to another' (Chopra & Wallace, 2002; Hung et al., 2004; Rousseau et al., 1998; Staab, 2004; Tschannen-Moran & Hoy, 2000; Ulivieri, 2005; Wang & Emurian, 2003). Starting from definitions previously proposed and using the interpersonal connotation as our focus (Castelfranchi & Falcone, 1999; Chopra & Wallace, 2002; Hung et al., 2004; Mayer et al., 1995; Riegelsberger et al., 2004; Rousseau et al., 1998; Ulivieri, 2005), we define interpersonal trust as:

> *a positive **psychological state** (cognitive and emotional) of a trustor (person who can trust/distrust) towards a trustee (person who can be trusted/distrusted) comprising of trustor's **positive expectations of the intentions and future behaviour** of the trustee, leading to a **willingness to display trusting behaviour** in a specific context.*

Exhibiting interpersonal trust implies dependence of the trustor on the trustee; indeed, it implies that the trustor is vulnerable and affected by the behaviour of the trustee, either positively or negatively, and still is willing to take the risk. Usually, the question of whether a trustee can indeed be trusted is evaluated on the basis of his or her overt behaviour, which the trustee shows in the context of trying to accomplish a particular objective that matters to both the trustor and trustee. We only need to build interpersonal trust if something is at stake and the outcome is uncertain (Riegelsberger et al., 2004): when a trustor is aware of certain risks. Combining concepts of risk introduced in Mayer et al. (1995) and Rousseau et al. (1998), we define risk as 'the perceived possibility of a loss or a gain as interpreted by the trustor, ''outside of considerations that involve the relationship with the particular trustee'' (Mayer et al., p. 726)'. Risk creates an opportunity for trust, whereas trust in turn increases the likelihood of risk-taking (a positive trust decision), which can lead to trusting behaviour. Interpersonal trust is an important mediating mechanism: the higher the risk, the higher the level of trust in principle needed to take the risk and display trusting behaviour (Hartman, 1999; Mayer et al., 1995; Rousseau et al., 1998), if the trustor comes to displaying behaviour at all. Trusting behaviour is the observable interaction of a trustor with a trustee, where risk is taken by the trustor's dependence on the trustee in a certain situation, following upon a positive trust decision. Mayer et al. (1995) state: ''whether or not a specific risk will be taken by the trustor is influenced both by the amount of trust for the trustee and by the perception of risk inherent in the behaviour'' (p. 726).

We can illustrate the difference between risk and risk taking (as a positive trust decision) with the following example: If you are considering to climb a mountain with a(n) (un)trustworthy person, the circumstances will not change (you still face the fact and risk that you can, for example, fall), but you dare to accept and take this risk (in spite of the potentially serious consequences) and will rather climb this mountain (trusting behaviour) with a trustworthy person than with an untrustworthy person. So, there is a difference between (perceived/estimated) risk and risk-taking, in which the latter is dependent of the perceived properties of the accompanying person, his or her perceived trustworthiness, as well as the circumstantial risk, all considered while making, in this case, a positive trust decision. Whether a person decides to take the risk is perceivable in the display of trusting behaviour. An interpersonal trust state both has a cognitive (e.g., grounded in perceived properties of a situation) and emotional dimension (e.g., feelings of connection to each other) (Kanawattanachai & Yoo, 2005; Meyerson et al., 1996), which influence each other. A trust state as such is a complex mix of cognition and emotion, comprising of positive (or negative) feelings towards that which is trusted (Corritore et al., 2003) and reflects ''assessments of current cognitive processing and its implications for the goals of the individual'' (Hampson & Morris, 1999), as opposed to, for example, feelings of 'fear' and 'joy'. The latter are each basic emotions, which not necessarily

require cognitive processing and which relate directly to sub-cortical parts of the brain and physiological reactions (Ortony & Turner, 1990; Pessoa, 2008; Roediger et al., 1999). This means that trust, as an emotion, grows on the basis of an interpretation, appraisal and attribution of stimuli, signs and signals within a trust requiring situation, but that this interpretation can be coloured by other emotions, e.g., by the mood of the trustee (Dunn & Schweitzer, 2005; Hampson & Morris, 1999; Pessoa, 2008). It does not necessarily have to be based on evidence or warrant (Chopra & Wallace, 2002). Although someone may feel affection for another person upon their first acquaintance, this is not yet to be considered as trust. The affection may of course influence his or her interpretation of signals and behaviour to assess the trustworthiness of this person in initial stages more favourably (Arnold, Cooper, & Robertson, 1998; Roediger et al., 1999) and will therefore sooner lead to a positive trust state.

We now turn to the process by which an interpersonal trust state is formed and compare a face-to-face project team with a virtual team, in order to identify differences. We focus principally on the cognitive processes that lead to a specific interpersonal trust state as empirical research shows that these processes are more prominent in situations in which the trustor and trustee do not yet have an extensive history of interaction. A direct trust decision grounded in an existing strong positive or negative feeling for a trustee is highly unlikely in a virtual project team. A particular trust state may be formed by immediate affective reactions that lead to an intuitive or identification-based 'thin' trust state. This 'thin' trust state is grounded in peripheral cognitive processing of information and based on, for example, perceived overlap of values, intentions or on attraction to another (Olekalns & Smith, 2007). But this level of trust will probably not yet be enough for a trust decision: a trustor will further evaluate whether a trustee is worthy of his or her trust. A trust state may also be the result of a long-term personal, reciprocal relationship and bonding, in which respect and care for another led to a deep, 'thick' trust state (Gabarro, 1978; Lewicki et al., 1996, 1995; McAllister, 1995; Rempel et al., 1985). In new situations in which a trustor needs to trust a trustee, this type of 'thick' trust state often leads to an immediate trusting behaviour without re-assessing a trustee, also called trusting via the habitual route (Hung et al., 2004; Petty & Cacioppo, 1986). As lack of prior history typically applies to virtual project teams, we ignore this type of trust formation process (Chopra & Wallace, 2002; Kanawattanachai & Yoo, 2005). Over time, a 'thick' trust state, grounded in very strong emotional bonds, may develop in virtual project teams, but that requires repeated experience (Greenberg et al., 2007).

2.2 The process of interpersonal trust formation

Figure 2.1 represents our cognitive model for the formation of interpersonal trust in face-to-face project teams. Following Zolin et al. (2002), we differentiate between the concepts of 'trust' and 'trustworthiness': Interpersonal trust comprises the perceived trustworthiness of a trustee. Trustworthiness is the trustor's assessment of how much and for what type of performance a trustee can be trusted (Hardin, 2002). Although interpersonal trust is also influenced by other factors, trustworthiness is the main factor, as documented by empirical research (Tanis & Postmes, 2005; Zolin et al., 2002).

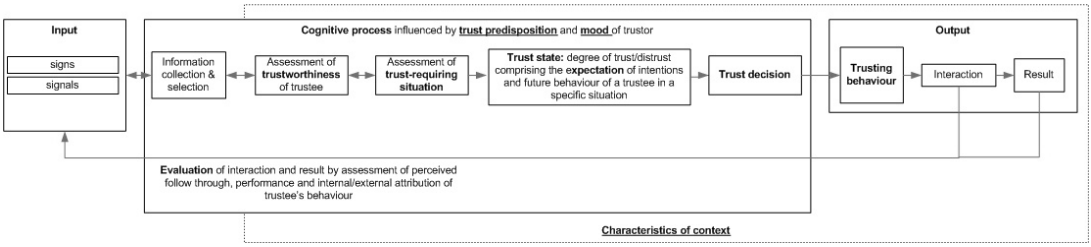

Figure 2.1. The process of interpersonal trust formation

The cognitive model for the formation of trust consists of three parts: **input**, which is observable; a cognitive **process**, which cannot be observed directly; and **output**, the observable outcomes of the cognitive process. The cognitive process and the outcomes are influenced by characteristics of the context as well as by the trust predisposition (a stable positive, neutral, or negative tendency to evaluate trust) (Rotter, 1967) and the mood of a trustor. The cognitive process consists of information collection, assessment of trustworthiness, the assessment of the overall situation in which trust is required (influenced by mood and trust predisposition and by taking trustworthiness and context into account), leading to a trust state (a cognitive and emotional psychological state), and a trust decision. A positive trust decision can, but does not necessarily lead to the display of trusting behaviour.

Members of virtual project teams, just as members of face-to-face teams, form, monitor, and assess a cognitive model of a trust-requiring situation; the antecedents of interpersonal trust also seem similar in virtual and face-to-face teams (Henttonen & Blomqvist, 2005; Lewicki et al., 1995). Thus, we may assume that the process of trust formation in virtual project teams will evolve in ways similar to those in face-to-face teams. However, there are also differences. Team members of virtual projects need more time (Jarvenpaa & Leidner, 1998; Wilson et al., 2006) and generally develop less 'thick' (stable through time) interpersonal trust (Bos et al., 2002; Hung et al., 2004; Wilson et al., 2006; Zolin et al., 2003). Moreover, virtual

project team members tend to 'stick' more to their initial perceptions of trustworthiness, whether they are based on stereotypes or on initial interactions. This will colour their perception and assessment of the interaction and the performance of the trustee during the project (Zolin et al., 2002, 2003). Together, these differences are likely to make interpersonal trust formation more difficult in virtual teams than in face-to-face teams. Keeping this in mind, we now examine each of the three parts of the trust formation model (input, cognitive process, and output) and investigate the problems that virtual project teams may encounter when they form interpersonal trust. Figure 2.2 displays an overview of the main differences influencing the interpersonal trust formation process of virtual teams compared to face-to-face teams.

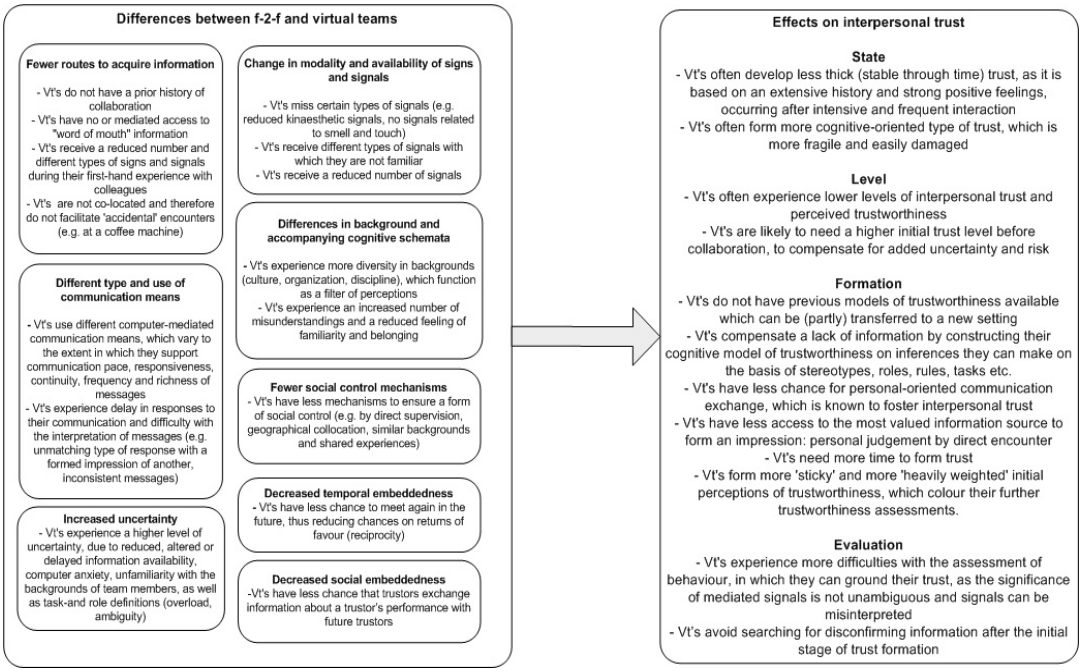

Figure 2.2. Differences between virtual and f2f teams influencing interpersonal trust formation

2.2.1. Input

Signs and signals - In face-to-face encounters, people form an impression of others that is based on signs (perceived properties of objects or events) and signals (perceived properties of objects or events with an intended communicative function) (Bacharach & Gambetta, 1997; Donath, 2006). Signs and signals can have different modalities that are related to our senses, such as sound, visual, kinaesthetic, smell, and touch (Kandola, 2006; Riegelsberger, 2005). We receive signs and signals

through different routes, which can be either direct or indirect (Hung et al., 2004). A direct route means that input about a person is acquired through first-hand experience, in encountering and interacting with this person; an indirect route means that we receive the input from a third party who had experience with the person involved.

In computer-mediated situations the type and number of signs and signals that can be used to form an impression, are limited or very much different from the ones people are used to, while information transfer routes are hampered. Not all the information that is available in face-to-face settings, and with which people are familiar, can be mediated. Riegelsberger (2005) and Olson and Olson (2000a,b) collected examples of visual and auditory cues which we use for the construction of a cognitive model of trustworthiness and which are not necessarily available in mediated settings. They mention physiognomy, gestures, body movements, posture, and para-verbal cues (e.g., intonation, pitch, modulation, speed, regional accents). In contrast, a computer-mediated setting provides opportunities to offer alternative, but yet unfamiliar, signs and signals, which would not be possible in a face-to-face setting. Due to these changes regarding availability and familiarity of signs and signals, virtual project team members are handicapped in their assessment of trustworthiness. This affects the formation of interpersonal trust.

2.2.2. Cognitive process

After the trustor receives input, a cognitive process occurs, which consists of the following parts: information collection and selection; assessment of the trustworthiness of a trustee; assessment of the trust-requiring situation; formation of a trust state; and trust decision. We describe each part in turn.

Information collection and selection - People perceive and interpret signs and signals that will help them to assess a situation. They assign different weights to this information, taking into account the 'input' route. Signs and signals acquired through a direct encounter with another person will be valued more than those acquired through ''word of mouth''. After all, people tend to rely more on their direct personal judgement than on that of others, as was found in Kollock's field studies in online communities (Kollock, 1994). People could also rely on reputational information provided by third parties, but when referring to people this information has the largest positive effect on the trust-formation process only if it is provided by someone with whom a trustor already has a strong social tie (Mui, Halberstadt, & Mohtashemi, 2002; Preece, 2000). Mui et al. (2002) state ''in evaluating a stranger's trustworthiness, we weigh those of our friends' opinions about this stranger by how much we trust our friends and come to a conclusion on whether we are going to trust this stranger. Hence, propagation of opinions (of which ratings is one) in human society is a very natural phenomenon.''(p. 37). Such strong social ties between

virtual project team members are not to be expected in the context of global virtual project teams, unless there are already systems available which are specifically designed to support these bonding processes within and between collaborating organizations (e.g., via a reputation-sharing system or via stimulating informal networks).

Hung et al. (2004) apply Petty and Cacioppo's (1986) elaboration likelihood model for attitude change to the phenomenon of trust. In this model two main cognitive processes for trust formation are distinguished: a deliberate, conscious and active consideration of available information and a less cognitively aggravating, more automatic, emotion-grounded assessment via a habitual route. The second 'assessment' is based mostly on an extensive shared history and personal bonding with another person. According to Hung et al. (2004), trust based on this reinforced, habitual route is relatively resilient, durable and not easily disrupted, thus ''thick''. However, when it is shattered, it is not easily restored. We assume that the second process is less likely to occur in the initial phases of virtual project teams, because team members seldom share the extensive history that is needed to develop strong personal bonds. The habitual assessment, based on the strong positive feelings developed for a specific person, can occur after intensive and frequent interaction between virtual project team members, but this requires time as well as positive interaction experiences (Kandola, 2006; McAllister, 1995).

Within the deliberate, active process of establishing cognitive trust again two sub-routes are distinguished: the peripheral route and a central route of cognitive processing. Within the peripheral route, trust is based on information processing that is category, schema, and heuristic driven. Hung et al. (2004) typify trust that is based on cognitive models constructed via the peripheral route as ''fragile or thin'' and states that it is easily withdrawn, because it lacks personal knowledge of the trustee on which to base expectations. In these cases, even minor violations of a trustee could lead to distrust. In contrast, it is also easily repaired once misinterpretations or errors in inferences are clarified and meaning is renegotiated (e.g., due to different cognitive schemata of what is considered as ''appropriate behaviour'' used in different cultures). The central route of information processing involves the deliberate consideration of relevant information and evaluating its merits in a specific situation. This route requires more cognitive effort, but information that is processed in this way tends to be more enduring and stable.

There are several reasons why trustworthiness in virtual project teams is generally created along a peripheral route. First of all, members generally have no shared working experience or previous cognitive models of each other's trustworthiness (Jarvenpaa & Leidner, 1998). Given the cross-disciplinary and inter-organizational nature of a virtual project team, they have little chance to receive third-party information on the reputation of a co-worker, the type of information which would have significant impact on the trustworthiness assessment (Kollock, 1998; Mui et al.,

2002; Preece, 2000). They also have less overall time to collect information about their co-workers and about the whole trust-requiring situation than people in face-to-face teams have (Kanawattanachai and Yoo, 2005). Thus, instead of elaborate gathering and processing of information on team members, the virtual project team is dependent on first impressions – and their shallow processing – and on information subsequently gathered during collaboration with fellow team members. Zolin et al. (2002) found that team members who were geographically distributed, in contrast to co-located teams, had less personal communication; in turn, this was associated with lower perceived trustworthiness and lower trust.

Finally, the limited communication means of virtual project teams, in terms of pace, frequency and richness of messages (Olson & Olson, 2000a,b), may impede appropriate and timely assessment of the behaviour of other members, which may effect group performance – by increasing the occurrence of misunderstandings (Cramton, 1997) and the delay in responses in asynchronous communication media (Hung et al., 2004, Giddens (1990) in Riegelsberger, 2005, Walther, 2005) – and trust formation, which is hence based on more shallow or stereotyped reasoning.

Assessment of the trustworthiness of a trustee - People build a cognitive model of perceived trustworthiness that is based on the properties of a trustee. These properties are used as evidence for their trustworthiness (Goffman, 1959; Macrae & Bodenhausen, 2001). Examples of such properties are the trustees' supposed honesty, ability and openness. They are called the antecedents of trustworthiness (Jarvenpaa et al., 1998; Mayer et al., 1995).

The trust-warranting properties of a specific trustee are derived from the receiver's interpretation of signs and signals, such as the countenance, average response time on messages, and quality of performance within a team, in relation to the antecedents of trustworthiness. Thus, signs and signals become cues ('proof') for trust warranting properties that are part of the cognitive model of the trustworthiness of a specific trustee (Castelfranchi & Falcone, 1999; Donath, 2006; Gambetta, 1988; Kramer, 1999; Mayer et al., 1995; Riegelsberger et al., 2004; Rousseau et al., 1998; Wang & Emurian, 2003). In the cognitive model of trustworthiness of a trustee, traces of prior encounters are maintained and new information is used to update the model. When assigned properties of the trustor in the cognitive model of perceived trustworthiness match the requirements of a new situation, one may expect that the trust-formation process is accelerated and the trustor reaches a trust decision sooner (Castelfranchi, 2006). For example, people are not likely to trust a car mechanic to do their finances, but might ask him to help them with their plumbing.

When people do not receive signs and signals that match their cognitive model of trustworthiness, they will compensate by constructing a cognitive model of trustworthiness of a trustee on the basis of the knowledge that is available. Examples are

inferences made on the basis of stereotypes, roles, rules and tasks, organizations, culture, and (social) groups (Hung et al., 2004; Postmes et al., 2005). In all these cases, people assign properties to an instance of a certain class or category of broader concepts. For example, 'Alan is an expert and experts can be trusted within their domain'. They will use these clustered previous positive or negative experiences to extrapolate through time and make predictions about the future (situations and behaviours).

Members of virtual project teams often have different work, discipline, and culture-related cognitive schemata and expectancies of each other's behaviour. These existing schemata are the 'filters' people use when they are operating in a context, trying to achieve a result and perceiving each other's behaviour. These differences in perception may become a source of misunderstanding and conflict in a virtual project team. They may also reduce the feeling of familiarity or the sense of belonging to the same group or (social) category, which is one of the factors that contribute to perceived trustworthiness and thus to interpersonal trust (Feng et al., 2004; Kramer et al., 1996; Postmes et al., 2005).

Assessment of the trust-requiring situation - People form interpersonal trust on the basis of a model of the trust-requiring situation. Existing research (Abrams et al., 2003; Castelfranchi & Falcone, 1999; Gambetta, 1988; Riegelsberger et al., 2004) suggests that this cognitive model comprises of at least two components:

- the perceived trustworthiness of the trustee (e.g., based on perceived ability and motivation of trustee, as discussed in the previous section).
- the characteristics of the context (e.g., the amount of risk, locus of control and external factors which can influence the behaviour of the trustee).

The cognitive model constructed is also influenced by the overall trust predisposition and mood of a trustor. Trust predisposition (Rotter, 1967) is an attitude, a stable positive, neutral or negative tendency to evaluate trust-related information that is independent of the situation or characteristics of the trustee. The trust predisposition of a trustor will influence the trust-formation process even before information about others becomes available (Mayer et al., 1995). The processes that lead to a model of the trustrequiring situation are influenced by the emotional state (the mood) of the trustor at the moment of assessment, but these factors will only influence the attributions of properties in the model (Arnold et al., 1998; Dunn & Schweitzer, 2005; Williams, 2004). A trustor will evaluate information on the components and weigh the importance of this information in order to form a cognitive model of a specific trust-requiring situation. The trustor answers the question: what kind of behaviour is the trustee likely to display in this context while we are jointly trying to achieve this result? Thus a certain expectation of the intentions and future behaviour of the trustee is formed (Castelfranchi & Falcone, 1999).

Formation of a trust state - The 'trust state' is a cognitive and emotional psychological state that people normally refer to as 'trust' or 'interpersonal trust'. The interpersonal truststate as a mix of cognition and emotion is gradual (has levels) and dynamic, not stable (Rempel et al., 1985), fluctuates over time, and is based on experiences of the trustor with the trustee. It may have negative values (distrust) (Jian et al., 1997), based on a negative impression or experience with a trustee in a certain context. Others have argued that the concept of distrust even requires a separate conceptual model (Lewicki et al., 1996; Kramer, 1999; McKnight et al., 2002).

A positive trust state is still no guarantee for action, because a trust state can exist without the direct necessity or opportunity to display trusting behaviour (Castelfranchi, 2006); due to circumstances a trustor might not have had the chance to act trustfully in a specific situation.

Trust decision - A decision to trust precedes and is a preparation for the display of trusting behaviour. A trustor weighs the possible risks and rewards (Castelfranchi, 2006; Zolin et al., 2002) against the current trust state. This trust state is influenced by the trust predisposition, mood, the assessment of the context, and the perceived trustworthiness of the trustee. A trustor decides if and how (s)he will act, partly based on his or her personal threshold of risk acceptance or avoidance, and the corresponding level of trust (Castelfranchi, 2006).

In some circumstances the trust state and trust decision may be based primarily on contextual control mechanisms, e.g., supervision by a teacher. Here, clear expectations of the behaviour of a trustee exist. It can also be based primarily on the perceived trust-warranting properties (Riegelsberger, 2005) and trustworthiness of the trustee. In both cases the cognitive model of the trust-requiring situation will be different. The resulting interpersonal trust state can have higher or lower levels and can be more susceptible to experience with a trustee over time and other changes, but both can lead to a trust decision and trusting behaviour which will look more or less the same from the outside. Only in the trustor's mind is the behaviour grounded in different considerations.

Importance of context - Certain characteristics of the context influence the cognitive processes as well as the output and behaviour of a trustor. One of the most important context factors is the perceived risk. Without a risk or a chance of a reward, it is not necessary to establish interpersonal trust. In its core mechanism interpersonal trust aims to cope with risk and increase the chances of 'survival' of the trustor (Deutsch, 1960; Luhmann, 2000; Riegelsberger, 2005). If people run a high risk, they will need higher and 'thicker' trust before they make a positive trust decision ('risk taking'), unless extreme conditionsapply, for example after a life-

threatening accident where time pressure and immediate action is crucial (Meyerson et al., 1996). In terms of risks run in a working context, Zolin et al. (2002, p. 12) state that:

> ''the value at risk for the trustor equates to the value of what will be lost if the trusted person does not perform. Failure to perform by the trusted person may result in loss of overall project quality, time invested, or reputation if the failure interferes with the trustor's ability to meet obligations. Perceived risk may be mitigated by social controls such as binding contracts, procedural norms and so forth (Shapiro, 1987) or exacerbated by uncertainty and lack of information.''

Other risks faced by virtual project teams are the chance that confidential information falls in unauthorized hands and that a team is unsuccessful in achieving the goals in time or not at all, which could eventually lead to degradation or losing one's job (Dubé & Paré, 2004; Trautsch, 2003). Compared to face-to-face settings, computer-mediated settings also increase the level of perceived risk and uncertainty during collaboration. Reduced, altered, and delayed information availability can increase uncertainty (Giddens, 1990 in Riegelsberger, 2005) among team members. In addition, computer anxiety, a reduced number of social control mechanisms (e.g., direct supervision, geographical collocation, similar backgrounds, and shared experiences), and difficulties with defined roles (overload, ambiguity) are factors which increase perceived risk (Hung et al., 2004).

Unfamiliarity with a specific person, the culture of the organization a person is affiliated with, and general cultural norms can also increase the sense of uncertainty of (virtual) project team members. When they perceive higher risk and uncertainty, people tend to compensate with trust (Deutsch & Jones, 1962; Luhmann, 2000). This could indicate that virtual project team members need to establish a higher interpersonal trust state, before they decide to 'take the risk' and start to display trusting behaviour (Hartman, 1999). Without trust, team members are not willing to take risks for fear of not meeting expectations or even of losing their jobs (Kanawattanachai & Yoo, 2005).

Another aspect of the context that is of particular interest to project teams is the extent to which a trustor is dependent on the actions of the trustee. This correlates with perceived risk and vulnerability. If the risk is high and a trustor is highly dependent on the performance of a trustee, he or she is also more vulnerable. In working contexts the degree of dependability is mainly dependent on the task structure. This relates to questions on task and role division, task complexity, domain familiarity (Do we have to build on each other's knowledge in order to be able to complete the task?) and time pressure within a project (Are we dependent on each other as resources to complete a task in time?) (Hung et al., 2004).

Besides organizational control and monitoring mechanisms, individual control and monitoring opportunities can help to reduce perceived risk. Hung et al. (2004, p. 8) state that ''for collaboration actions to be successful, one should either possess the ability to closely monitor or trust the parties involved. The ability to control the others is, thus, inextricably interlinked with perceived risk – the lower the perceived control, the greater the perceived risk''. According to Castelfranchi (2006), individual control and trust are not mutually exclusive. This conflicts with studies where monitoring and controlling behaviour are used as indicators of lack of trust between people. Rather, a feedback and monitoring process can help mitigate risk and thus facilitate the formation of trust (Castelfranchi, 2006).

Riegelsberger et al. (2004) distinguish three contextual properties that can create additional incentives for a trustee to fulfil the expectations of a trustor: temporal, social, and institutional embeddedness. These contextual factors help the trustor to behave vulnerably, even if little is known about the intrinsic properties of the trustee. When we apply the model of Riegelsberger (2005) to the context of a virtual project team, we see that often only institutional embeddedness serves as an incentive. Temporal embeddedness refers to the chances that the trustor and trustee will meet again in the future. If they have stable identities and expect to meet again, a trustee is keener to meet expectations, due to the chance of reciprocity (return of favour) in the future. Social embeddedness refers to the possibility that the trustor exchanges information about a trustee's performance with other trustors, thus contributing through an indirect route of information spreading to the reputation of a trustor. Trustees who know that trustors exchange information about their behaviour have an incentive to perform, even if they do not expect any future interaction with this trustor (Riegelsberger et al., 2004). Temporal and social embeddedness can occur in organizations in which reputational information is generated and spread, for example by means of specifically designed ICT-supported knowledge management systems. If there are no systems in place (either ICT or organizationally supported) to exchange reputational information, it is unlikely that this exchange will happen spontaneously. In these cases there is often little temporal and social embeddedness, because virtual project teams are operating inter-organizationally or, when intra-organizational, geographically dispersed; temporarily; in a distributed and mediated way, and on the basis of a one-off encounter. Furthermore, team members usually do not know each other well in advance; often do not have a prior history of working together; do not have the opportunity to meet face-to-face frequently; are unlikely to work with each other again in the near future and thus have little chance for reciprocity; and do not share an elaborate social network (thus, often they do not have a lot of ''word of mouth'' reputation information available from sources with whom they have strong social ties). When institutional embeddedness is applicable, both trustor and trustee know that defection of the trustee, who operates under institutional constraints, has serious conse-

quences for the trustee (e.g., the loss of a job). Therefore, in most virtual project teams, the institutional embedding will be the strongest contextual incentive for fulfilment, unless organizations have taken special measures in order to increase temporal and social embeddedness.

Due to the computer-mediated nature of communication between virtual project team members, there is less opportunity for personal communication; however, sharing personal information is known to strengthen the bond between people (Zolin et al., 2003). Feng et al. (2004) mention that users in online settings are also more sensitive to mixed or contradictory messages in which emphatic emotion and type of response do not match. They report an effect on trust, which in the case of inconsistent messages becomes more fragile and is thus more easily damaged. Moreover, information may flow less easily between team members (Zolin et al., 2002), there is more delay between a trusting action and fulfilment thus increasing uncertainty (Riegelsberger, 2005), information can be misunderstood or not be grounded equally among team members and may negatively affect the perception virtual project team members have of each other (Cramton & Webber, 2005).

2.2.3. Output

Trusting behaviour, interaction and evaluation - Once people have reached a trust decision, following upon a positive trust state, they accept any risk left and may act according to their trust state (Castelfranchi & Falcone, 1999): they can display trusting behaviour. In the case of virtual project teams examples of trusting behaviour are the sharing of (confidential) resources, division and delegation of tasks, open communication of problems encountered during task execution, and acting on the basis of information provided by other team members. In short, they will share resources and collaborate with the trustee. Initially the trust state relies to some extent on signs and signals from first impressions and/or inference from a stereotype. Now, it can be updated using information gained from direct interactions with the trustee. The expectations of the trustee can be compared with the actual behaviour and interaction, and on the basis of this evaluation the trust state will be updated.

The results of the evaluation process can be twofold: either the trustor attributes the behaviour to internal causes and accordingly updates the trust state to a more positive or negative attitude, or the behaviour is attributed to external unfavourable causes. In the latter case the trustee is excused for not having met expectations, because the trustor attributes the behaviour to negative external circumstances beyond anyone's control (Castelfranchi & Falcone, 1999). In these cases, the trust state will generally stay stable until further interaction and internal outcome attribution become possible.

Iacono and Weisband (1997) and Jarvenpaa and Leidner (1998) found that higher trust states were established and kept within (virtual) teams that were con-

tinuously and frequently interacting during the whole project. They explain this by the re-evaluation (enfeebling or reinforcing) of cognitive models based on experiences during interaction.

Compared to face-to-face teams, virtual project teams have less (familiar) information available and it is less visible (Cramton & Webber, 2005). Not only information on the personal characteristics of virtual project team members, but also information related to their behaviour and performance during collaboration is sparse and difficult to interpret. Zolin et al. (2002) found that the cognitive model that trustors form initially persists longer unchanged in virtual project teams than in face-to-face teams. They explain this stability of perceived trustworthiness, perceived performance, and trust by the lack of information available in a computer-mediated setting and the tendency to avoid searching for disconfirming information after an initial cognitive state of trustworthiness is created. Jarvenpaa and Leidner (1998) also found that virtual project teams that have developed trust in the initial stages of the project team are more likely to sustain high levels of trust.

All these findings emphasize the importance of establishing an initial cognitive model of perceived trustworthiness for the formation of interpersonal trust, because the initial 'bias' can influence the perception of actual performance. But how can we help virtual project teams with the formation of an initial cognitive model of perceived trustworthiness? The remainder of this article is devoted to this question.

3. How to foster initial interpersonal trust in a virtual project team?

One way to support the formation of trustworthiness in virtual project teams is to make personal knowledge and task-relevant background information available (Hung et al., 2004, Kanawattanachai & Yoo, 2005; Olson & Olson, 2000a,b). Jarvenpaa and Leidner (1998) found that high-performing virtual project teams exchanged background and personal information and were socializing more with other members from the very beginning of their project. Zolin et al. (2003) found a relation between more personal communication and perceived trustworthiness. Feng et al. (2004) claim that ''developing artefacts to help people to identify others who are similar to themselves or who have similar experiences may be helpful for promoting empathic attitudes that build interpersonal trust''(p. 20). They mention story-telling, in a free form as well as guided by a more formal template, role-playing games, teambuilding exercises, and the facilitation of specific types of searches as approaches to meet the information need of trustors.

Thus, one strategy to speed up the taking of a trust decision and the growth of 'thicker' and less fragile trust is to speed up the initial formation of a model of trustworthiness by supplying information on trust warranting properties. Although research shows that personal information is important to develop interpersonal trust

within virtual project teams, it remains unclear which specific information helps to foster interpersonal trust. One approach is to look at existing theory on trustworthiness antecedents. Unfortunately, very little research has been done on this. Riegelsberger et al. (2004) made a start, using the commonly accepted triad of ability, benevolence, and integrity.

In the following section we introduce a detailed schema of the antecedents of trustworthiness called the TrustWorthiness ANtecedents (TWAN) schema (Figure 2.3). We derived it from a literature survey in which both theoretical and empirical literature from different domains (e.g., management, psychology) as well as contexts (e.g., private as well as professional) was reviewed on trust and trustworthiness antecedents. This schema is a first step towards the development of a design framework which could be used to determine the type of personal information that is important for team members to have available. We provide a preliminary example of how this schema can be used, once it is empirically validated with professionals, to check whether all antecedents are relevant in a professional context.

3.1. A TrustWorthiness ANtecedents (TWAN) schema

Mayer et al. (1995), Butler and Cantrell (1984) and Butler (1991) distinguish three types of overlapping antecedents of trustworthiness: ability, benevolence and integrity. In Mayer et al. (1995) ability is defined as ‘‘… that group of skills, competencies, and characteristics that enable a party to have influence within some specific domain’’ (p. 717); benevolence as ‘‘the perception of a positive orientation of the trustee towards the trustor’’ (p. 719); and integrity as ‘‘the trustor’s perception that the trustee adheres to a set of principles that the trustor finds acceptable’’ (p. 719).

Although this division helps to clarify the ‘consistence’ of perceived trustworthiness, it does not include all antecedents which are mentioned in literature. Such-antecedents include ‘openness’ (Mishra, 1996) and ‘communality’ (Berscheid & Walster, 1978). In constructing their antecedents schema Mayer et al. (1995) aimed to reduce complexity. Their reasoning is based on analytic arguments, not on empirical research. They group these antecedents, which might have been considered separately, under the three main antecedents of ability, benevolence, and integrity. McKnight et al. (2002) also reviewed literature on antecedents for trustworthiness and trust in e-commerce settings by counting the occurrences of antecedents in reviewed articles. Although they initially found 15 antecedents, they regrouped and excluded some of the antecedents they found based on their number of occurrences. This analysis led them to conclude that ability, integrity, and benevolence can be considered as the main antecedents. However, the high occurrences of these antecedents could be the result of other causes, for example the repetitive number, track, and history of citations. As a consequence of using this criterion for exclusion of antecedents, they excluded antecedents they did in fact find in their review, for

example 'predictability', 'openness', and 'carefulness'. Moreover, an antecedent mentioned in an earlier paper (McKnight & Chervany, 2000), 'shared understanding', is not part of the adopted trusting-beliefs model. We argue that a more detailed schema of the antecedents of trustworthiness is necessary if we want to ground design decisions for information provision in it. In a recent article Schoorman, Mayer and Davis themselves argue that an elaboration and reconsideration of the antecedents is needed (Schoorman et al., 2007). In addition Castelfranchi and Falcone (1999) emphasize the need for a more complex model for the assessment of trustworthiness and interpersonal trust. To identify potential antecedents we reviewed available conceptual as well as empirical literature on trust, trustworthiness and the measurement of perceived trustworthiness. In this review we did not restrict ourselves to literature of trust and trustworthiness in professional settings, but also considered literature that reports on trust in other type of non-hierarchical human relations (e.g., trust between couples). The resulting TrustWorthiness ANtecedents schema (TWAN) is summarized in Figure 2.3 and consists of five main antecedent categories and underlying antecedents. As part of future research, this model of trustworthiness needs further empirical validation among professionals.

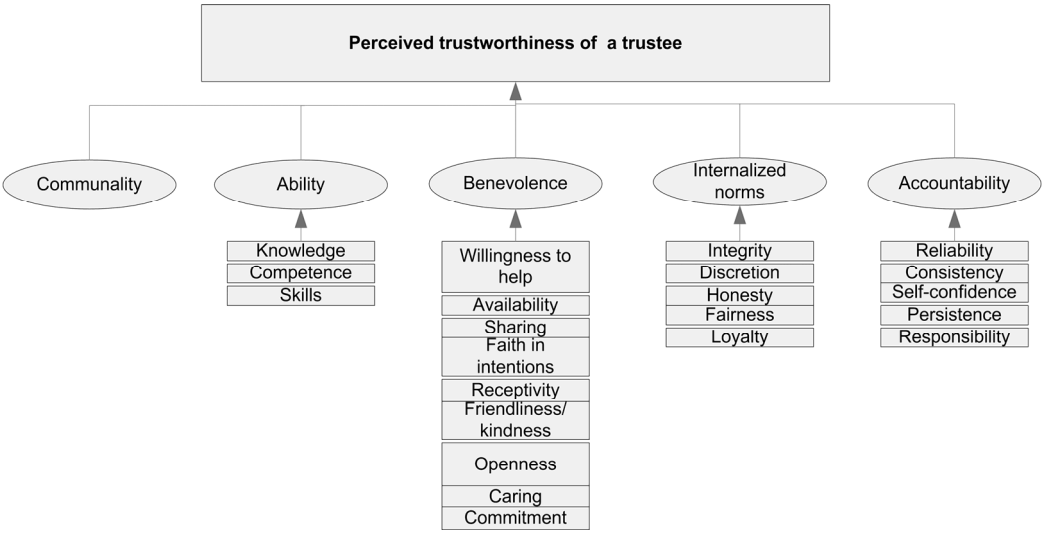

Figure 2.3. The TrustWorthiness ANtecedent schema (TWAN)

The five main antecedent categories and the underlying antecedents of the Trustworthiness ANtecedents schema (TWAN) are further described in Table 2.1.

Table 2.1. The TrustWorthiness ANtecedents (TWAN) schema

Communality	
Personal characteristics which the trustor has in common with the trustee (Abrams, Cross, Lesser, & Levin, 2003; Feng et al., 2004; Illes, 2006; Levin et al., 2002; Olson & Olson, 2000b). This can be any shared characteristic, like a similar goal they want to achieve, shared language use, common identity characteristics or shared values. Even trivial ones, like a shared hobby or the same type of pet they have, can contri-bute to this category.	
Ability	
Capability of a trustee, determined by knowledge, skills and competences, which enables him/her to perform tasks within some specific domain (Butler, 1991; Butler & Cantrell, 1984; Mayer et al., 1995). Ability includes the extent to which a person seems:	
To recall facts, concepts, principles and procedures within certain domains (Jarven-paa et al., 1998; McKnight et al., 2002)	*knowledge*
Able to act properly and with a good result while solving problems in a complex, real-life environment, using and integrating one's personal characteristics, know-ledge, and skills (Cook & Wall, 1980)	*competence*
To have acquired a proficiency in the execution of operations to achieve a certain goal state (Butler, 1991; Cook & Wall, 1980)	*skills*
Benevolence	
The perceived level of courtesy and positive attitude a trustee displays towards the trustor (Mayer et al., 1995). Benevolence includes the extent to which a person seems:	
To give support in situations in which it is needed (Cook & Wall, 1980; Jeanquart-Barone, 1993; Rempel et al., 1985; Van Rozendaal, 1997; Zolin et al., 2002)	*willingness to help*
Approachable and reachable for another person (Van Rozendaal, 1997)	*availability*
Not to keep sources and resources to him/herself and to give access to them to other people (Butler, 1991; Zolin et al., 2002; Rempel et al., 1985)	*Sharing*
To act in another person's interest and does not exploit this person when vulnerable (Rempel et al., 1985; Johnson-George and Swap, 1982; Cummings et al., 1996; Van Rozendaal, 1997; Cook & Wall, 1980)	*faith in intentions*
Interested in another person's ideas and feelings, and to listen to them and take them into account while acting (Butler, 1991; Zolin et al., 2002; Johnson-George & Swap, 1982; Cook & Wall, 1980)	*receptivity*
Friendly and easy to get along with (Jeanquart-Barone, 1993; Johnson-George & Swap, 1982; Van Rozendaal, 1997)	*kindness*
To reveal oneself, in terms of personality and thoughts, to another person (Butler, 1991)	*openness*
Concerned about other people's interests (Sheppard & Sherman, 1998; Olson & Olson, 2000b)	*caring*
To show dedication and engagement towards something (Jarvenpaa & Leidner, 1998; Kanawattanachai & Yoo, 2005; Zolin et al., 2004)	*commitment*

Internalized norms **The intrinsic moral norms a trustee guards his actions with. These differ from benevolence in that they are directed towards others in general, rather than toward a specific trustor (Chopra & Wallace, 2002). Internalized norms include the extent to which a person seems:**	
Sincere and unable to be corrupted (Johnson-George & Swap, 1982)	*integrity*
To keep sensitive information confidential (Butler, 1991)	*discretion*
Not to mislead or lie to others (Cummings et al., 1996)	*honesty*
To treat people equally (Butler, 1991; Johnson-George & Swap, 1982; Cummings et al., 1996)	*fairness*
To respect and to be true to another person (Butler, 1991; Johnson-George & Swap, 1982)	*loyalty*
Accountability **The degree to which a person is liable and accountable for his/her acts and meets expectations of another person. Accountability includes the extent to which a person seems:**	
To follow up on any appointments and commitments made and shows adequate judgment to act in encountered situations (Butler, 1991; Zolin et al., 2002; Rempel et al., 1985; Johnson-George & Swap, 1982)	*reliability*
To display consistent character traits and predictable behaviour (Butler, 1991; Rempel et al., 1985)	*consistency*
To believe (s)he is able to perform a task (Castelfranchi & Falcone, 1999)	*self-confidence*
Stable in the intentions formed to complete a task, irrespective of difficulties encountered (Castelfranchi & Falcone, 1999)	*persistence*
To accept part of the work load and to use his/her ability to accomplish a task (Zolin et al., 2002; Cummings et al., 1996; Cook & Wall, 1980)	*responsibility*

The TrustWorthiness ANtecedents schema (TWAN) is assembled from the assumption that the assessment of trustworthiness takes place between people with a professional relation in knowledge-intensive collaborative settings; moreover, they should operate at similar levels in the organizational hierarchy. The latter is an important assumption, as in different trust-requiring circumstances, different antecedents of trustworthiness may be more important than others. For example, Butler and Cantrell (1984) report a result from Gabarro (1978) that for a superior the integrity, competence, and consistency of a subordinate are the most important antecedents, whereas for a subordinate the integrity, loyalty (motives) and openness of the superior were most important (Butler & Cantrell, 1984). But, in order to design for different trust-requiring situations, it is important to take all antecedents into account. Table 2.2 illustrates how the TWAN schema can be used. It should be noted that this is just an illustration, not a validation of the TWAN schema. That

would require empirical research among professionals. Once validated, the framework can be used to design interventions that foster the formation of interpersonal trust.

Table 2.2. Illustration of relation between information elements and the TWAN schema

	Information initially available before collaboration		
	Information and description	**Relation with TWAN**	**Explanation**
Static	Photograph	Communality Ability Openness Kindness	• Trustors can determine gender and estimate age from the trustee. Based on this, trustor can determine if the trustee can already build on a lot of work experience (ability) as well as whether or not the trustor and trustee have gender and age in common (communality) • The type of photo chosen (a formal or informal situation in which the trustee is displayed) can reveal if a trustee is open to e.g., display hobbies/leisure activities (openness) as well can offer further opportunities to discover common interests (communality). • Expression on and type of photo reveals initial information on whether a person seems kind (kindness)
Static	Expectations: statements on what a team member expects of a project and other team members and what the others can expect from him/her	Communality Ability Willingness to help Faith in intentions Receptivity Fairness Honesty Kindness Openness Commitment	• Statements allow trustors to see if expectations of a trustee overlap with their expectations (communality) • The type of expectations and the way they are expressed give information on previous experience and expertise of trustee (ability) • When trustees not only state what they know, but also what they expect to learn from the project it provides cues for interest in (receptivity) and respect of expertise (fairness) of others as well as clarity on what contribution others can expect (honesty, openness as well as ability) • The way expectations are expressed gives information of the general attitude the trustee displays in relation to others (willingness to help, faith in intentions, kindness, openness) • When not only expectations which are related to external motivation, but also to internal motivation are mentioned, this provides cues how dedicated a trustee will be to a project (commitment)
Dynamic	Updated list of professional/private interests (e.g., based on delicious bookmarks)	Communality Knowledge Sharing Commitment Honesty Consistency	• List provides a trustor with an overview of the expertise areas a trustee is interested in, not only in relation to the project and its specific time span, but in a broader sense (knowledge), which allows mirroring with the expertise areas of the trustor (communality) as well as checking if a trustee has taken an interest in these areas for a longer period

	Information initially available before collaboration		
	Information and description	**Relation with TWAN**	**Explanation**
			of time (consistency) • When domain interests of a trustee overlap with a project's content, cues for intrinsic motivation can be derived (commitment) • The act of sharing appreciated sources with others can provide a trustor with a cue of what type of behaviour to expect during collaboration (sharing)
Dynamic	Availability for project (e.g., week roster, adaptations to general roster, contact data, holidays, time zone)	Willingness to help Availability Commitment	• Available time frames and the type of communication media mentioned to contact one (e.g., Skype, mobile phone) provide knowledge of overall approachability and when and how a trustee can be reached (availability). It also provides initial cues of how reachable a person is within the project (willingness to help, commitment)

	Information derived from behaviour during collaboration		
	Information and description	**Relation with TWAN**	**Explanation**
Static	Mail read/not read by addressed person requires 'assigned' messages)	Availability Reliability Responsibility	• A trustor can see if a trustor can be held accountable for having seen certain problems, questions within an acceptable time span (availability and reliability) • A trustor can see if a trustee undertook action based on the knowledge obtained (responsibility)
Static	Suggestion/idea for project	Competence Willingness to help Sharing Openness Commitment Self-confidence Persistence Responsibility	• Sharing ideas to improve a situation in a project makes a trustee vulnerable (openness), but also shows goodwill to a project (commitment) and its members (willingness to help, sharing) • The quality of the ideas expressed reveals information on the expertise of the trustee (competence) as well as the action of sharing can provide cues for the self-confidence of the trustee (self-confidence) • Sharing ideas to counter problems shows that a person acts to deal with problems and is not deterred by them (persistence) as well takes initiative to solve them (responsibility)
Dynamic	Task-status overview (task, accepted by, deadline, status)	Competence Reliability Responsibility	• Shows trustors what types of tasks a trustee accepted (competence) and for what tasks questions can be addressed to him/her (responsibility) • Shows a trustor whether a trustee finished most of the tasks as agreed (reliability and responsibility)

	Information derived from behaviour during collaboration		
	Information and description	**Relation with TWAN**	**Explanation**
Dynamic	Average response time when specifically addressed (requires 'assigned' messages)	Availability Receptivity Commitment Consistency Responsibility	• Provides a trustor with cues of how fast a person in general responds to messages of project members (availability, commitment, consistency) or if he/she responds at all when needed (receptivity, responsibility)

In this example we differentiate between different categories of information: information which becomes available in the initial phases of collaboration and information that is derived from collaborative behaviour and hence becomes available only during collaboration (Danis, 2000). We here use the concept 'static' and 'dynamic' information differently from Danis (2000). She defined static as 'a description that is provided by the user before the interaction begins' and dynamic as 'data derived from the person's behaviour'. Although this conceptual difference is useful, an additional distinction is necessary. There is also information which can be made available before interaction begins, but which can dependent on the person's individual behaviour (e.g., collecting URL's) in general and not specifically related to their collaborative behaviour. We therefore distinguish between information that is available before collaboration and information available during collaboration, and between static, fixed information which is not subject to continuous updates, and (partly) dynamic, changeable, continuously updated information (Rusman et al., 2009). Each exemplary information element is classified according to these categories and we describe subsequently how the TWAN schema can provide a means to select important information which should be or become available in virtual project teams.

Based on this type of analysis, one can determine if an information element provides evidence for more than one antecedent in the TWAN framework and thus has a higher 'weight' and importance in comparison to other information elements. Information elements which provide unique evidence, not provided by any other information element, gain importance as well. As already indicated, the assumptions, rules and guidelines that went into the building of the TWAN schema can ultimately only be justified through empirical research, which ultimately leads to a validated design framework. So far such research has not been carried out yet.

4. Conclusion and further research

Our literature review showed that the formation of interpersonal trust relies to a large extent on the formation of a cognitive model of trustworthiness. In contrast with face-to-face projects teams, virtual project teams often have less information on which to base their assessment of trustworthiness. In the absence of signs and signals they fall back on inferred information (e.g., based on stereotypes or other categorical cognitive schemata). This may lead to erroneous and rather persistent judgments of trustworthiness (for better or for worse), and a more fragile form of interpersonal trust grounded in role-based and schemabased information instead of personal characteristics of a trustee.

Previous research shows the importance of signs and signals for the formation of a cognitive model of perceived trustworthiness in general (Bacharach & Gambetta, 1997; Bos et al., 2002; Donath, 2006; Olson & Olson, 2000 a,b; Riegelsberger, 2005). It does not, however, address the relation between the signals offered and the cognitive schemata of trustworthiness. Most research has aimed to measure the effect of the modality, not so much the significance of signals for perceived trustworthiness and/or interpersonal trust. We expect that specific signals, which are grounded in cognitive schemata of trustworthiness and its antecedents, will accelerate the formation of a cognitive model of trustworthiness and thus also of interpersonal trust in a specific trust-requiring situation.

We therefore propose a cognitive schema for trustworthiness, which we called the TrustWorthiness Antecedents (TWAN) schema. Project team members may use this schema as a reference when assessing the trustworthiness of a particular trustee of equal standing in a professional, trust-requiring situation. Based on this assessment, they then are able to form a cognitive model of the trustworthiness of a specific trustee. Their cognitive model is an elaborated instantiation of the cognitive schema for trustworthiness. If it is empirically validated, this schema may also be used to inform the design of virtual collaboration environments.

The model for interpersonal trust formation and the TrustWorthiness ANtecedents (TWAN) schema is grounded in an extensive review of theoretical and empirical literature from different domains and contexts. Nevertheless, some constraints need mentioning that are inherent to this collection of literature and the current study. First, we have assumed that the process of trust formation in virtual project teams will evolve in ways similar to those in face-to-face teams and used this model as a benchmark to identify similarities as well as differences mentioned in contemporary literature between both settings. This assumption needs further verification in empirical research. Second, current literature on interpersonal trust and trustworthiness in (virtual project) teams principally addresses knowledge-intensive professional situations in western cultures, as found in Europe, Australasia and the United States. It could therefore very well be that the antecedents of trustworthi-

ness for a construction worker are different, as this is a less knowledge intensive form of collaboration. It is also possible that they are (partly) culturally determined and as such not applicable in professional settings in non-western countries, for example Asian countries such as China and India. Third, we would like to stress that the scope of the TrustWorthiness Antecedents (TWAN) schema is restricted to relations between individuals of equal standing in collaborative settings. The schema is therefore neither simply applicable to larger units, such as groups and organizations, to different units, such as objects (e.g., websites), nor to different types of relations, e.g., hierarchical relations. However, within these bounds, we have tried to provide an exhaustive antecedents schema for trustworthiness.

In the next phase of our research the TWAN schema will be empirically validated among professionals and subsequently used as a design framework. After empirical validation of the integrated schema of antecedents, we will specifically test (i) which kind of signals trustors mark as important when they perceive trustworthiness of trustees in different virtual project team settings; (ii) how these signals relate to the antecedents in the trustworthiness schema. Furthermore, we will investigate (iii) which specific information about virtual project team members should be made available to foster the formation of a cognitive model of each other's trustworthiness.

Chapter 3

Measuring professional trustworthiness: a new TrustWorthinessANtecedent model and scale

Rusman, E., Van Bruggen, J., Valcke, M., Sloep, P., & Koper, R. (submitted). *Measuring Professional Trustworthiness: a New TrustWorthinessANtecedent Model and Scale.*

Abstract

In this article a new model for professional cognitive-based trustworthiness assessments, the TrustWorthiness Antecedent (TWAN) model, is operationalized and empirically tested in a field study. The model extends the tripod 'ability-benevolence-integrity' model of Mayer et al. (1995) with several antecedents such as "communality" and "persistence". In this study we developed scales for each trustworthiness antecedent, wherever possible based on previously used measurement items. Individual professionals subsequently rated two colleagues on their professional trustworthiness (n= 2360) on these scales. Content, construct validity and reliability measures were employed to test the scales. This led to an adapted version of the TWAN model and accompanying scales. Subsequently, to determine the most parsimonious measure for professional trustworthiness, the predictive power of the model for a General Trust (GT) value was assessed. The antecedents of "communality", "skills", "sharing", "caring", "discretion", "responsibility" and "persistence" proved to be the best predictors across two random samples of professionals.

'*The key is to get to know people and trust them to be who they are. Instead, we trust people to be who we want them to be- and when they're not, we cry.*' (David Duchovny)

1. Introduction

Research on the role of perceived trustworthiness for interpersonal trust is dominated by the model put forward by Mayer, Davis, and Schoorman (1995), which conceptualizes perceived trustworthiness in organizational settings. The key antecedents of trustworthiness in this model are ability, benevolence and integrity. The Mayer et al. (1995) model is based on an extensive literature research and is developed within a particular domain, namely management, with the purpose of integrating research on trust from different domains. It focuses on cognitive-based trust rather than affective-based trust (McAllister, 1995). They inventoried antecedents of perceived trustworthiness and then clustered the ones they found in three groups, based on conceptual arguments and with the aim to reduce complexity. Their model was designed to be as parsimonious and as generally applicable as possible. In this way, antecedents which might have been considered separately became part of a higher-order concept, based on an a priori analysis, not on empirical evidence. Examples of such antecedents are 'openness' (Mishra, 1996) and 'communality' (Berscheid & Walster, 1978). Many researchers used the Mayer et al. (1995) model to define and measure trustworthiness, without further empirical validation of the model. In a recent article, the originators of the model (Schoorman, Mayer, & Davis, 2007) encourage researchers to reconsider and elaborate their trustworthiness antecedents model, and especially emphasise measuring trust and trustworthiness in specific contexts and relationships (e.g., supervisor vs subordinate).

Rusman, van Bruggen, Sloep and Koper (2010) proposed such an elaborated TrustWorthinessANtedent model (TWAN) for professional trust based on a new review of interdisciplinary literature of the antecedents of trustworthiness. This model was proposed in an effort to ground the presentation of information on virtual team members in the antecedents that trustors use to form a first impression of trustworthiness of a trustee in non-hierarchical, professional settings. To enable such a grounding of information, a more detailed version of the antecedents that constitute a professional trustworthiness assessment was needed. They argued that exclusion of antecedents should be based on empirical research, in addition to theoretical and analytical arguments. Therefore, in their model all cognitive-based trustworthiness antecedents reported in research about trust and trustworthiness in professional as well as private settings were included. In the present article we report on attempts to operationalize the proposed model in a

scale, called the professional TrustWorthiness ANtecendents scale (TWAN scale). We also report the results of a large-scale empirical study designed to test and validate this scale. This study aims to answer the following questions:

- How reliable and valid is the TWAN scale for professional trustworthiness?
- Are all antecedents of the TWAN scale of equal importance for the assessment of professional trustworthiness?

The present article first summarizes the TWAN model, its terminology and the activities undertaken to operationalize the model. Second, the design and results of a large-scale empirical study among professionals of equal standing are presented. Here we aim to determine whether all proposed antecedents are relevant and important for the assessment of professional trustworthiness in practice and whether the model and scale hold when tested in professional contexts. The article concludes with a validated version of the TWAN model and scale, and a discussion of the current study. Covered are the study's limitations and implications for our understanding of professional trustworthiness assessments as well as the possible use of the TWAN model and scale in practice.

1.1. Theoretical background: Interpersonal trust and (the antecedents of) trustworthiness

Trustworthiness is the individual's assessment of how much and for what type of performance someone else can be trusted (Hardin, 2002). People assess trustworthiness by collecting signs and signals of particular characteristics of another person (Donath, 2006, 2007; Six, Nooteboom, & Hoogendoorn, 2010) and test these against their conceptual model of trustworthiness. Signs and signals can be acquired through several routes, such as (initial)direct interaction or collaboration with a person, as well as by receiving reputational information through a third party. In this way, based on the acquired signs and signals, one determines whether for instance another person is friendly, open or responsible. This perceived trustworthiness is an important determinant of interpersonal trust between people. Interpersonal trust is a positive psychological state (cognitive and emotional) of a trustor (person who can trust/distrust) towards a trustee (person who can be trusted/distrusted) comprising trustor's positive expectations of the intentions and future behaviour of the trustee, leading to a willingness to display trusting behaviour in a specific context (Castelfranchi & Falcone, 1999; Chopra & Wallace, 2002; Hung et al., 2004; Mayer et al., 1995; Riegelsberger et al., 2004; Rousseau et al., 1998; Ulivieri, 2005). Interpersonal trust is a key determinant of successful collaboration between people, in face-to-face as well as virtual teams (Beer et al., 2003; Brown, 2000; Corbitt et al., 2004; Dignum & Van Eijk, 2005; Furumo & Pearson, 2006; Gambetta, 1988; Jarvenpaa & Leidner, 1999; Raes et al., 2006; Walther, 1995, 2005), independent of whether it

directly or indirectly influences collaboration and knowledge exchange (Dirks & Ferrin, 2001; Szulanski, Cappetta & Jensen, 2004).

As a trustor's interpersonal trust state is predominantly determined by the perceived trustworthiness of the trustee, next to their own trust predisposition (Rotter, 1967) and mood combined with the characteristics of the trust-requiring situation, it is important to know what antecedents constitute a trustor's trustworthiness assessment. Ferrin, Bligh and Kohles (2008) specifically focussed on the direct relation between trustworthiness perceptions and cooperation and found that they mutually influence another: trustworthiness perceptions mediate cooperation as well as co-operative interactions influence these perceptions. If one knows more about the nature of trustworthiness assessments, one can support them and the entire trust formation process by offering trustors the signals 'needed' for their assessment; also, one may stimulate trustees to provide these signals, for example by means of carefully designed ice-breaking activities, forms in groupware systems or behavioural guidelines (Six et al., 2010).

As already indicated, this article builds on the TrustWorthiness ANtecedent (TWAN) model of Rusman et al. (2010) for professional trustworthiness assessments. This model modifies and extends the commonly accepted Mayer, Schoorman & Davis (1995) model for professional trust, which contains as antecedents 'ability', 'benevolence' and 'integrity'. Mayer et al. (1995) define ability as '… that group of skills, competencies, and characteristics that enable a party to have influence within some specific domain'' (p. 717); benevolence as ''the perception of a positive orientation of the trustee towards the trustor'' (p. 719); and integrity as ''the trustor's perception that the trustee adheres to a set of principles that the trustor finds acceptable" (p. 719). The TWAN model contains 23 antecedents, grouped in 5 clusters, two of which it shares with Mayer et al.: 1) communality, 2) ability, 3) benevolence, 4) internalized norms and 5) accountability. Rusman et al. (2010) define communality as "personal characteristics which the trustor has in common with the trustee"; ability as "capability of a trustee, determined by knowledge, skills and competences, which enables him/her to perform tasks within some specific domain"; benevolence as "the perceived level of courtesy and positive attitude a trustee displays towards the trustor"; internalized norms as "the intrinsic moral norms a trustee guards his actions with"; and accountability as "the degree to which a person is liable and accountable for his/her acts and meets expectations of another person". Please note that internalised norms differ from benevolence in that norms are directed towards the other in general, rather than towards a specific trustor, as does benevolence.

As the TWAN model is a rather detailed model, it should potentially support professional trustworthiness assessments quite well. This is the more likely as it also includes all antecedents previously mentioned in trust and trustworthiness literature, in private as well as professional contexts. This study tests whether the ante-

cedents included in the model are indeed also applicable in professional contexts. Appendix B provides definitions of the different antecedents within each of the five clusters of the TWAN model.

1.2. Development of scales for the TWAN model

To develop the TWAN scale, we searched the literature for studies which reported the development or use of specific scales with items to measure trust and/or (the antecedents of) trustworthiness. Rather than look for theoretical postulates of antecedents, we focussed on measurable items. 43 articles reporting items for the measurement of trust or trustworthiness were identified (see Appendix A). This resulted in an inventory of items potentially useful to measure the antecedents of professional trustworthiness defined in the TWAN model. Based on this inventory, subscales consisting of four items were developed for all antecedents. Items were selected from the existing item pool based on their fit with the concept as well as on their use in previous research contexts. Thus, the items in the scale were, to the extent possible, based on existing measures listed in the inventory (see Appendix C for an overview). Additional questionnaire items were composed for 3 antecedents for which fewer than 4 items could be found: 'communality'; 'knowledge' and 'integrity'. For the antecedents 'Self-confidence' and 'Persistence' no existing items could be found at in the trust-oriented measurement literature. This is an indication that these antecedents, although proposed by theory, were not yet operationalized and tested in practice. For these antecedents new items were formulated. Also, positive and negative phrasing of questions was balanced in the scales of each antecedent.

All this resulted in a draft version of the TWAN scale. Figure 3.1 provides an overview of the structure of the scale. The item numbers (I1 to I92) match the items of the TWAN scale, as presented in Appendix C.

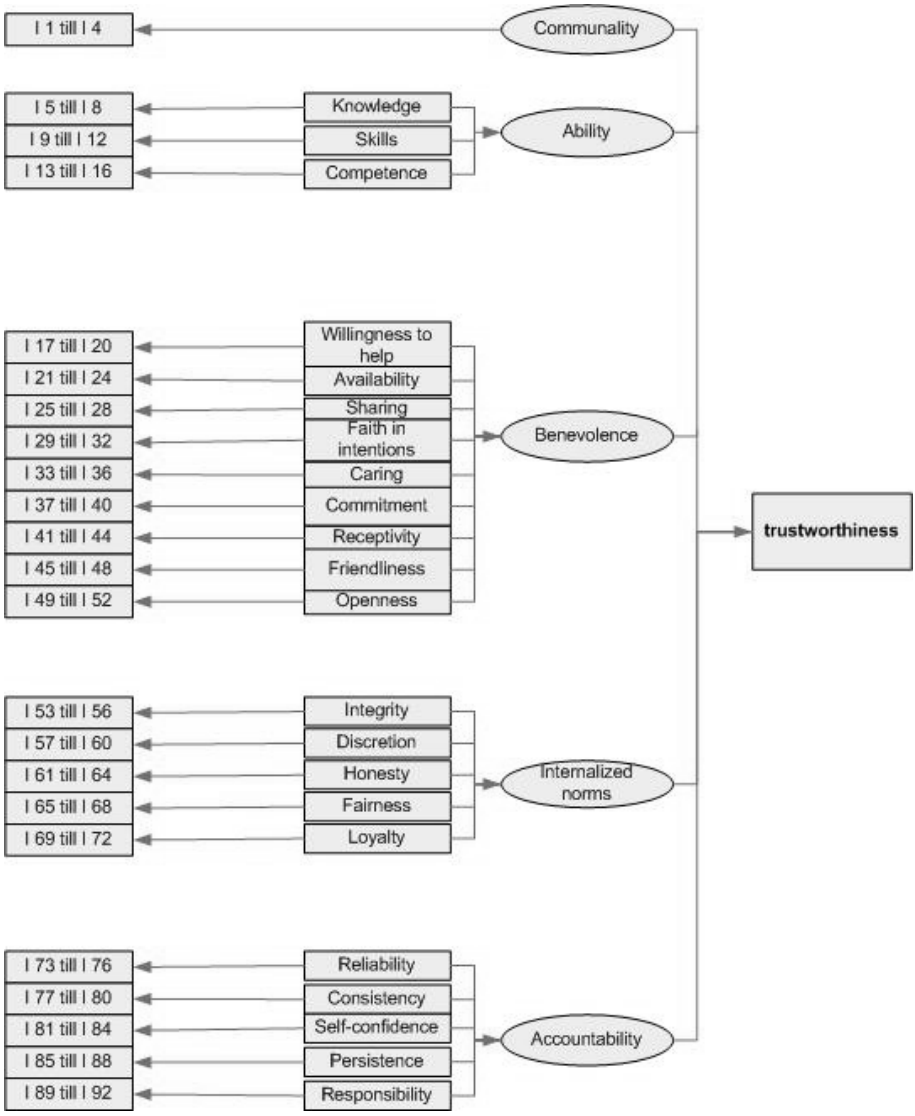

Figure 3.1. Structure of the proposed TWAN scale to measure Professional Trustworthiness

This draft version of the TWAN scale was used to construct a first version of a questionnaire, in which all items of the scale were mixed in order to prevent direct recognition of the antecedents. This questionnaire was then pilot-tested with 10 respondents who each had minimal 5 years experience in professional project work. They reviewed the antecedents and the proposed scales for their suitability as representatives of perceived trustworthiness of professionals; they also checked the questionnaire for the comprehensibility of the questions and the accompanying

instruction. This resulted in small adaptations of the scale and the instructions. The final version of the TWAN scale then consisted of 92 questions and can be found in Appendix C. This version was used in the rest of this study.

2. Method

In order to test the TWAN scale thus arrived at, an empirical field study was set up at Ghent University (Belgium). Data, rating a large group of professionals (n = 2360) both on the antecedents (AT) as well as on a general measure of trustworthiness (GT), were collected (see items in Appendices C and D). From these data two samples were drawn. Sample 1 (n= 1164) was used for scale-purification and model-calibration purposes, to explore which antecedents were the best predictors. Sample 2 (n=1196) was used to validate the model thus obtained.

2.1. Participants

The dataset was obtained from 1180 respondents, who each rated two people with whom they had professionally collaborated in a non-hierarchical relation in a project. Thus, we collected 2360 cases of people who were assessed on their professional trustworthiness. The cases differed significantly, with professional settings ranging from nursing to policy making. Because the questionnaire also contained a number of open questions (e.g., about the organization and job function of the respondent), the data were screened on their legitimacy (including an analysis of differences in the handwriting). This did not lead to the exclusion of any data. 52% of the respondents were male, 48% female. The ages of the respondents varied between 17 and 71, with a mean of 39, although the age of the majority of respondents fell between 20 and 55. It seems that the sample contains two broad types of respondents: advanced students who probably already experienced project work during their study (age group 17 till 29) and employees of professional organizations (age group 30 till 71). The majority of the respondents (71%) belonged to the latter group. It is likely that the people they rated also belong to this group as they hinted at their professional collaboration with colleagues. 82% of respondents reported that the project teams they belonged to counted between 2 to 13 additional project team members.

2.2. The composition of the questionnaire

As the respondents were all native Dutch speakers, the original English version of the questionnaire was translated into Dutch. This translation was checked by two independent experts; as a consequence a number of small revisions were made. The

questionnaire contained open-ended, as well as closed-ended questions. Open questions referred to background variables of respondents, such as type of organization, goals of the project and the degree of personal acquaintance with other project team members. In this article only the results of the closed questions are reported. These questions referred to (the antecedents of) trustworthiness and reflect the items within the scales represented in Appendix C. In addition to the trustworthiness antecedents (AT) proposed by the TWAN model, three additional measures were included: general perceived interpersonal trust (GT), trust predisposition (TP) and perceived risk (R) in a project. The general perceived interpersonal trust (GT) is a widely accepted measure of the trust state of a trustor (Beranek, 2000; Jarvenpaa & Leidner, 1999; Dirks & Ferrin, 2002; Gill, Boise, Finegan & McNally, 2005; Robert, Dennis & Hung, 2009) proposed by Mayer & Davis (1999); trust predisposition (TP) is a stable positive, neutral, or negative tendency to evaluate trust (Rotter, 1967); perceived risk (R) is the value of what will be lost if the trusted person does not perform as expected. As Zolin et al. (2002, p.12) state: "Failure to perform by the trusted person may result in loss of overall project quality, time invested, or reputation if the failure interferes with the trustor's ability to meet obligations." Literature indicates that both latter variables are likely to influence general trustworthiness, which in this study is used as a criterion variable. Appendix D provides an overview of the additional measures.

All items were shuffled in the final version of the questionnaire, to prevent bias interference when replying to subsequent items. Consequently, respondents could not easily recognize the relationship between questions and a specific antecedent. Respondents were asked to rate individual questions on a 7-point Likert scale: (1) Strongly disagree, (2) Disagree, (3) Slightly disagree, (4) Neutral, (5) Slightly agree, (6) Agree and (7) Strongly agree. Respondents were instructed to fill in the questionnaire twice, subsequently keeping two different persons in mind both from the same project context, one whom they trusted most and one whom they trusted least. In this way, it was expected that differences in measurement related to trustworthiness could be traced best.

2.3. Preliminary analysis of additional measures

The measure for general perceived interpersonal trust (GT) of a person was used as a reference criterion for the antecedents of trustworthiness. Mayer & Davis (1999) proposed and validated this measure. With them it had a management focus; here it is slightly altered to reflect a more general orientation. Their original study of 1996, conducted with Schoorman, Mayer and Davis, also had a more general orientation. According to this study, the scale had a good internal consistency, with a Cronbach alpha coefficient of .82. In our study, the Cronbach alpha coefficient was .81 in sample 1 and .79 in sample 2, indeed indicating similar scale reliability.

In addition, a measure for the Trust Predisposition (TP) of a person was used, assuming that a general tendency to trust others would influence a person's judgement of a specific other professional. This TP measure was based on a shortened version of the Rotter scale for General trust (1969), which was modified by Yamagashi, Cook, and Watabe (1998) and reported in Zolin, Hinds, Fruchter, and Levitt (2002) (Appendix D). The latter found a low Cronbach alpha of .47 for the full version of this scale with 12 items and indicated that more research was needed to determine the importance of trust predisposition in predicting trust. In this study, with the restricted version of the scale with 6 items, the alpha was .86 and .85 for respectively sample 1 and sample 2. This, we felt, is sufficient to take the TP measure into account.
Although a previously used measure for perceived risk (Zolin et al., 2002) was also included in the questionnaire, this measure was found to be insufficiently reliable (Cronbach alpha of .6). It was therefore left out of the remainder of our analysis.

2.4. Procedure

The data were collected by 225 trained bachelor level research-students, enrolled in the Educational Sciences program at Ghent University. Each student collected responses from a minimum of 5 professionals with project work experience in a professional context. Application domains of the projects were diverse; e.g., they ranged from health care to education to informatics. Project experience could have been gained in a face-to-face setting, online, or in a mix of these. Respondents were told that it would take about 15 minutes to complete the questionnaire and that their responses would be kept confidential. All data were gathered and subsequently processed by the research students with the support of pre-structured Excel files and an accompanying instruction. All materials, including paper versions of the questionnaires, were handed in.

2.5. Data analysis

To determine the reliability and validity of the TrustWorthiness ANtecedents (TWAN) scale, a two-step procedure was followed. First, two random subsamples were created, using the 'select cases' option in SPSS version 16: sample 1 (n= 1164) and sample 2 (n= 1196). Data from the first sample were used to fine-tune the theoretical model that guided the design and development of the scales. Also, the concurrent validity of the antecedents was determined using the General Interpersonal Trust value (GT) of a trustee as a reference. The value of the antecedents as predictors of GT was tested. In the second step, the model resulting from the former analysis was tested again, this time with the data from the second sample, in order to verify the model's stability. With this approach one may fine-tune a model to

best fit the data at hand and subsequently test it again independently. If the model proves to hold, this substantially strengthens its validation.

2.5.1. Scale purification and model calibration with sample 1

Several steps were taken to purify the scales and to test an initial model with trustworthiness antecedents. First the reliability of the scales was tested, then the underlying factorial structure of the scores on the questionnaire was determined and finally, using an existing value for General Interpersonal Trust (GT) of a trustee as a reference, an initial model of antecedents most strongly predicting this value was determined. Reliability of the TWAN scales was assessed by determining their internal consistency, using as criteria Cronbach's alpha, the mean inter-item correlation on scale level, and the corrected-item total correlation on item level. Reliability was considered for each of the proposed scales. Items that failed to meet the criterion that the corrected item-total correlation exceeded 0.3 were candidates for deletion. The same held for scales with an alpha ≤ 0.7 and mean inter-item correlation ≤ 0.3 (Pallant, 2007, p. 98). Assessing the initial 92 items, 5 items were deleted (AT_OPEN_secr and all 4 items within the Consistency scale), leaving a remaining item pool of 87 items for further analysis. All scale and item measurement properties are listed in Appendix C. Cronbach's alpha coefficients of the remaining scales all ranged between .74 and .87, whereas the mean inter-item correlations ranged between .42 and .64. All remaining scales displayed a strong internal consistency and were therefore considered as sufficiently reliable to be used in the rest of the study.

Additional data analysis aimed at the validation of concepts (content and construct validity) of the TWAN scale. This was done in two steps: first explorative factor analysis with principal components (PCA) and varimax rotation was employed to determine the underlying factorial structure of the responses to the questionnaire (Hair, Anderson, Tatham, & Black, 1998). Next, a concurrent validity test was done to explore the predictive power of the antecedent model. We will first describe the explorative factor analysis, then the concurrent validity test.

Explorative factor analysis

Prior to performing PCA, the suitability for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value was 0.989, exceeding the recommended value of 0.6 and Bartlett's Test of Sphericity reached statistical significance, thus supporting the factorability of the correlation matrix (Pallant, 2007).

A two-factor structure emerged (with the Screetest and Eigen values used as criteria) and items exhibiting low factor loadings (≤0.40) or high cross-loadings

(≥0.40) were candidates for elimination. Reviewing loadings, 4 items representing the concept Self-confidence behaved differently than the rest of the items, displaying no or lower than ≤0.40 loadings on this two-factor structure. These items were omitted from further consideration and with the remaining 83 items a one-factor model was estimated. This one-factor model accounted for approximately 50% of the total variance of the scores in the population. All factor loadings were between 0.43 and 0.82. Appendix C provides an overview of the loadings associated with the remaining 83-item factorial structure.

Concurrent validity test

The concurrent validity of the TrustWorthiness ANtecedent scale (TWAN) was determined by employing a multiple regression. With it, one may explore the predictive value of the antecedent variables and the trust predisposition (TP) variable with an established measure of general interpersonal trust (GT). Before carrying out this regression, normality of the distribution of general trust (GT) was checked and found to hold true.

The stepwise method for regression was then employed to determine the best predictor antecedents for this GT value. Although theoretically all antecedents relate to the general feeling of trustworthiness a trustor has of a trustee, it is likely that some antecedents are better predictors for interpersonal trust (GT) than others. While previous research considered an incomplete set of antecedents and provided a priori arguments only for which antecedents could be best, our decision to exclude antecedents is based on empirical grounds. As the stepwise method is known to provide the most parsimonious result for model explorations, by preventing overlap between predictors (Kemp, Snelgar, & Brace, 2000, p. 211), this method was selected. All proposed variables, including the trust predisposition variable, were entered at the same level. In this way, the TWAN scale was explored to identify the most important antecedents of professional trustworthiness.

The tolerance and VIF values for each scale included in the model calibration were considered as a check for strong collinearity between the scales. The tolerance measure is usually considered to indicate serious collinearity if values are below 0.10 or 0.20. VIF values of 10 or more are also reason for concern (Field, 2000, p. 132). The lowest tolerance value found in the calibrated model was 0.19 and the highest VIF value was 5.4. Although the scales are expected to co-vary to some extent, as they all ought to measure facets of trustworthiness, these values indicate that from a statistical point of view one may consider the various constructs represented by the scales separately. The Durbin-Watson value was used as a criterion to test whether the assumption of independent errors was tenable. A value of 2 is generally considered as an indication that residuals are uncorrelated (Field, 2000, p.

137). The Durbin-Watson value of 1.97 in this sample indicates that this assumption was valid.

The number of outliers, indicated by a Cook's distance for each case larger than 1, was acceptable (Field, 2000, p. 124). The number of outliers remained under the number for influential cases that is acceptable, using the value associated with 2 standard deviations as a criterion, which states that 5% of the cases can be expected to be out of limits. Therefore, no additional corrections were carried out on the data.

2.5.2. Scale validation with sample 2

If the scales derived from sample 1 are valid and stable, the scale characteristics and regression model should be replicable with the data of sample 2. The reliability of the TWAN scale was re-assessed by using Cronbach's alpha and the mean inter-item correlation on scale level and the corrected-item total correlation on item level as criteria. The same criteria used in sample 1 were applied to determine candidates for deletion. All scale and item measurement properties are listed in Appendix C and D. Cronbach's alpha coefficients of the re-assessed scales all ranged between 0.72 and 0.87, whereas the mean inter-item correlations ranged between 0.40 and 0.75. These values are similar to the values acquired in sample 1 and indicate a repeated strong internal consistency between the items within each scale.
Starting from the model derived from the analysis in sample 1, multiple regression analysis with this restricted set of predicting antecedents was carried out on the data of sample 1, to test whether similar results were found. The enter-method of regression was employed for this analysis. An acceptable Durbin-Watson value (1.85) and number of deviating cases were found.

3. Results

As a result of employing the stepwise method to explore the TWAN model in sample 1, several alternative models were iteratively evaluated, and a significant model emerged. All significant predictor variables finally contributing to the best prediction of the general value of Trust (GT) in Sample 1 are shown in Table 3.1. This model had the best power to predict general trust ($F_{7,1068} = 305{,}85$, $p < 0.0001$), accounting for the explanation of 67 % of the variance, as indicated by the adjusted R^2 in Sample 1. Trust predisposition as well as 14 other proposed antecedents had insufficient or non-significant power to predict the general trust values in Sample 1.
This model was validated with the data in Sample 2 and similar results were found, as presented in Table 3.1. The predictor variables represented in the model here

also accounted for 67% of the variance in the criterion variable General Trust (F7, 1159 =337,66, p < 0.0001). Moreover, similar standardized beta-values were found.

T**able 3.1.** Multiple regression analysis on sample 1 (stepwise) and sample 2 (enter)

	Sample 1				**Sample 2**			
Predictor(s)	**b**	**SE b**	**ß**	**P**	**b**	**SE b**	**ß**	**p**
Constant	-3.35	.44			-2.84	.41		
Communality	.23	.04	.20	≤ 0.001	.25	.04	.21	≤ 0.001
Skills	.14	.04	.13	≤ 0.001	.13	.04	.13	≤ 0.001
Sharing	.2	.04	.17	≤ 0.001	.16	.04	.14	≤ 0.001
Caring	.12	.04	.11	0.003	.08	.04	.07	0.052
Discretion	.09	0.03	.08	0.007	.10	.03	.09	0.001
Responsibility	.14	0.04	.12	≤ 0.001	.17	.04	.16	≤ 0.001
Persistence	.12	0.04	.11	.006	.13	.04	.12	0.002

Note: sample 1: adjusted R^2 = .665, F (df=7,1068; p < 0.0001) = 305,85;
sample 2: adjusted R^2 = .669, F (df=7, 1159;p < 0.0001) = 337,66

4. Discussion and conclusions

In this article we reported on the operationalization and empirical test of the TrustWorthinessANtecedent (TWAN) model for the assessment of professional trustworthiness, as proposed by Rusman et al. (2010). The TWAN model was derived from a literature review that spanned different disciplines, combining trustworthiness antecedents mentioned in private as well as professional settings. Although the model was potentially useful (for employees, designers, trainers and managers) and offered more details than does the tripod model (ability, benevolence and integrity) of Mayer et al. (1995), it had not yet been operationalized and empirically validated. It is this study's specific contribution that is does precisely that: all antecedents were translated into operationalized variables, using existing measurement items wherever these were available. The model was tested across two large samples consisting of professionals in different domains (jointly, n=2360). To our knowledge, no one has yet validated such an extensive set of antecedents for the assessment of professional trustworthiness in such a large-scale empirical field study among professionals. Moreover, next to a model validation, this study also delivers an instrument to measure perceived professional trustworthiness.
This study, then, aimed to test the reliability and validity of the TWAN scale as a measurement instrument for professional trustworthiness. This resulted in an op-

erationalized and validated model and scale consisting of 21 antecedents, all loading on one factor. The antecedent 'consistency' (alpha = 0.67) could not be reliably operationalized, and therefore could not be taken into consideration for further analysis. Although in some studies, an alpha of this size is considered sufficient, we here deal with large groups of respondents and therefore employ a more stringent criterion. Also, relative to the other alphas found, this one is insufficiently reliable. The antecedent 'self-confidence' displayed a deviating factor loading. This is likely to be an indication that it represents a construct different than professional trustworthiness. It could be that self-confidence influences perceived trustworthiness assessments in private settings, but that it is seen as a distinct concept in professional settings. Although five clusters of antecedents were expected to be found, no such structure was verified in this study. This part of the study delivered an operationalization and validation of (part of) the TWAN model, resulting in a reliable and valid model and scale for professional trustworthiness, consisting of 21 antecedents, all measuring at the same level. This way the need to cluster antecedents in five clusters is eliminated.

The second part of the study aimed to determine whether all antecedents proposed by the TWAN model are of equal importance for the assessment of professional trustworthiness. As all antecedents in the TWAN model were derived from literature on trust and trustworthiness in private as well as professional settings, it could be expected that some of the antecedents would be more influential or applicable in professional settings only. This was further investigated by looking into their value as predictors of the perceived general interpersonal trust (GT) of a trustee. Next to providing an indication of different 'weights' of antecedents to assess professional trustworthiness and thus of their importance for the assessment, another reason for further analysis is the possible use of the operationalized model as a measurement instrument. A more parsimonious measurement instrument would benefit its possible use in practice.

Therefore, with the remaining 22 variables (the 21 antecedents plus Trust Predisposition) the concurrent validity of the TWAN model with the widely accepted interpersonal trust measure of Mayer and Davis (1999) was determined. 15 variables, including trust predisposition, had insufficient extra predictive power to predict the indicated general trustworthiness of a trustee. Trust predisposition turned out to be less predictive than we had expected on the basis of results reported in previous research. This may be due to this factor being especially influential in the initial phases of collaboration, something which ends once collaborators collect more information about each others characteristics and behaviour. The remaining 7 antecedents explained 67 % of the variance in the general trust levels indicated by the respondents, in Samples 1 and 2 alike. Only a limited number of the initially proposed antecedents of trustworthiness turned out to be relatively strong predictors for the general interpersonal trust value. Nevertheless, it is striking that the

remaining best predictors, each fall in one of the five originally proposed clusters within the TWAN model: 'communality'; 'skills' in ability; 'sharing' and 'caring' in benevolence; 'discretion' in internalized norms and 'responsibility' and 'persistence' in accountability.

The results of this study indicate that the TWAN model (and scale developed) at least partly holds as antecedents for the assessment of professional trustworthiness between project team members in a non-hierarchical work relationship. The remaining antecedents extend and detail the trustworthiness antecedent model from Mayer, Davis and Schoorman (1995). However, they do so on the basis of an empirical analysis rather than theoretical propositions. Almost all proposed scales were reliable, but not all proposed antecedents proved to be strong predictors for the estimated level of interpersonal trust in a trustee in a professional context. The experienced degree of 'persistence', 'communality', 'sharing', 'responsibility', 'discretion', 'skills' and 'caring' of a trustee emerged as the major and significant predictors for the general trust level indicated by a trustor. Each significant antecedent contributed with a different weight to the general perceived professional trust in a trustee. The antecedents 'communality', 'sharing' and 'responsibility' are the strongest predictors for interpersonal trust, followed by 'skills', 'persistence', 'caring' and 'discretion'. As we have questioned respondents from very different professional contexts (ranging from nurses to policy makers), it is likely that these results are useful and valid in many professional contexts.

4.1. Boundaries and limitations of study

Although respondents were told that their answers would remain anonymous, self-reported answers may always fall prey to being socially desirable answers, thus leading to a positive judgment of people they in fact consider little trustworthy. Next to that, people might have chosen to collaborate in a team of a particular composition rather than another one, so it is entirely possible that our sample consisted of people who are considered already more trustworthy than random colleagues. This would imply a restriction of range within this validation exercise, which could be a limitation for the coverage of the results in groups with very divergent perceived trustworthiness levels as well have influenced the importance of the different antecedents. Also, all respondents based their assessment on a rather extensive history of collaboration with people in their project, therefore enabling a judgement on all antecedents. It could be that the judgement of, for example, the antecedent of 'discretion', is more problematic in the initial phases of collaboration. After all, it seems to be more difficult to assess and to require more complex, experience-fed information collection.

4.2. Future research

Literature shows that several factors besides the antecedents of perceived trustworthiness influence interpersonal trust; cases in point are someone's mood, the characteristics of the situation and the perceived risk of the situation. In this study we tried to measure perceived risk, but our measure proved insufficiently reliable. Further research is needed to develop a satisfying measure for this construct, as well as for the operationalization of the additional constructs (mood, situational characteristics). This is likely to lead to an extension of the interpersonal trust model and further increase its predictive power. Also, someone's trust predisposition could well be time dependent: more influential in the initial phases of collaboration, less so later on. Indeed, the weights of the most influential antecedents found in this study could receive different emphasis at different phases of collaboration, as the current assessments were based on rather lengthy periods of collaboration. Clearly, these ideas need further exploration.

We were unable to create an internally consistent scale for the antecedent 'Consistency'. This is remarkable as Consistency is often mentioned in the literature. However, our inability does not necessarily mean it is not an antecedent of trustworthiness, only that we were here unable to construct a suitable measure for it. Further research may alter this. Again, this would imply verification of an extended version of the measurement instrument.

4.3. Conclusions and implications for practice

In summary, this study operationalized and tested a new model for the assessment of professional trustworthiness that resulted in an adapted version of the TWAN model and scale, containing 21 antecedents. Seven of them turned out to influence a general interpersonal trust assessment of a colleague most: "communality", "skills", "sharing", "caring", "discretion", "responsibility" and "persistence". Interpersonal trust, of which trustworthiness is an important determinant, significantly influences team performance and collaboration of face-to-face as well as virtual, online teams. Insights in its (most influential) antecedents could provide team members, project leaders, groupware designers and trainers with a framework to guide their activities. As the validated TWAN model is an elaborate model of antecedents, it should prove helpful for them. It can help to raise their awareness of the nature of trustworthiness assessments in non-hierarchical collaborative, professional settings and guide their efforts to increase the visibility of relevant trustworthy signals and behaviour either by design, policy or by individual efforts. Awareness of which antecedents people consider while assessing professional trustworthiness could also be beneficial during job interviews. Finally, the model and measurement instrument could help analyse and overcome cases of problematic team collaboration that are the result of impaired interpersonal trust.

Chapter 4

From pattern to practice: Evaluation of a design pattern fostering trust in virtual teams

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Abstract

This article describes the implementation and evaluation of a design pattern that fosters trust in mediated collaborative settings. The pattern proposed here should provide a profile with static and/or dynamic information about the participants of a collaborative environment. It aims to foster initial (in the first two to three weeks) trust in situations in which people do not know each other and do not have a chance to meet, but need to collaborate. A simple and low cost implementation of this pattern was realized by conducting a case study with participants of the European Virtual Seminar on Sustainable Development (EVS). They were asked to fill in a template with personal information about themselves. In the EVS, students collaboratively have to address sustainable development problems. Afterwards, students were questioned on the use of this template, called PEXPI, and their impressions of each other during and after the EVS; questionnaires and a semi-structured interview were used. The results show that the implementation of the static profile, derived from the pattern, initially helped students to form an impression of each other. After this initial period, however, students base their impression on factors such as the quality of work-related contributions, behaviour during collaboration (e.g., responsiveness), and communication style. This case study also shows that the pattern could easily be applied and transferred to a new context, as long as the conditions described in the 'context'-section of the pattern, were met. The case study provided a means for evaluation of the pattern and a source for its refinement.

'*Evaluation is for making it work. If it works… Notice and nurture. If it doesn't work… Notice and change.*' (Brinkerhoff, Brethower, Hluchyj, & Nowakowski, 1983, p.i)

1. Introduction

Recently, the field of computer science has acknowledged the idea that findings from the domains of psychology and sociology matter to the design of group systems. The design of group systems that support Computer Supported Collaborative Learning (CSCL) and Working (CSCW) integrates knowledge of how people work and learn in groups with knowledge of enabling technologies (Preece, 2000; Schümmer & Lukosch, 2007; Wilson, 1991). This had led to several requirements for task-related functionality, such as facilities for communication, file-sharing, calendaring and scheduling (Vick, 1998). However, there are other, often less-obvious requirements. These relate to the support of psychological and social processes, which impact group cohesion and team performance, such as group dynamics and people's perceptions of each other. These processes have traditionally been studied in social sciences. As they are essential corner stones for team performance and interaction, they are thus also relevant for team performance in mediated environments. Indeed, according to Ackerman (2000), the main problem in group systems nowadays is the discrepancy between the social needs and expectations of the user and the computer system functionality.

Although 'social informatics' (Grudin, 1994; Kling, 1999; Preece, 2000) acknowledge the relevance of findings from the social sciences for the design of group systems, this does not guarantee their systematical incorporation in the actual practice of systems design. Kling (1999) notices that such findings are 'scattered in the journals of several different fields' (p. 1), which makes it hard to locate important studies. Moreover, system designers usually do not have enough time to orient themselves in domains which might contain parts and ideas which are useful (Erickson, 1997).

To overcome knowledge transfer and time problems the notion of 'design patterns' was introduced into the field of computer science; it was meant to enhance interdisciplinary communication and foster re-use of effective concepts (Borchers, 2003; Erickson, 2000). Design patterns provide a systematic, action- and design-oriented approach to incorporate findings from sociology and psychology in the design of computer systems. A pattern is a 'description of a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over' (Alexander, Ishikawa, & Silverstein, 1977). The strength of a design pattern is that it captures the essence of a ''problem – solution"-dyad in a specific context, and pre-

sents it in such a way that it can be applied and adapted in different settings (Dearden, Finlay, Allgar, & McManus, 2002; E-LEN, 2004; Erickson, 2000; Goodyear, 2005).

Design patterns for collaborative environments have been developed in several projects, such as E-LEN (2004), Patterns4Groupware (Schümmer, Fernandez, & Holmer, 2002; Schümmer & Lukosch, 2007) and the project that created the COLLAGE platform (Hernández-Leo et al., 2006). The development of a design pattern (language) is a cyclic and collaborative process, a designcycle that comprises the identification of a 'core idea', the production of a draft version, the collection of evaluative information and the (multiple) refinement based on the evaluative findings. It also involves the identification of related patterns (E-LEN, 2004; Retalis, Georgiakakis, & Dimitriadis, 2006). In previous projects the main focus was on the identification and development of design patterns which could be used as a means of communication during interdisciplinary and participative design of e-learning systems (Goodyear et al., 2004). Several methods for the identification of patterns have been suggested, involving bottom-up and top down approaches (e.g., Baggetun, Rusman, & Poggi, 2004) as well as a combination of these approaches (Retalis et al., 2006). In this article the focus is on the evaluation of an existing pattern. Various methods for the evaluation of patterns have been applied: review in the initial phase of pattern development by other experienced practitioners (designers/developers) taking the role of 'shephards' in so-called pattern writing workshops (Coplien, 1999; Harrison, 2000); implementation of the pattern in practice and measurements of user experiences and its success (or failure) in a case study (as was done in the TELL-project); usability (was it easy to understand and use it in the new context?) or by evaluation of its use by and usability for novice designers (Baggetun et al., 2004).

In this article we report on the implementation, evaluation and verification of the pattern 'Provide personal identity information' (Rusman, 2004) by means of a case study. This pattern is part of a group of patterns, which were developed around Computer Supported Collaborative Work (CSCL) within the E-LEN project. At the moment the pattern is linked only to the CSCL-pattern language developed in E-LEN, but it shares themes with the pattern group around ''User Gallery" (Schümmer, Lukosch, & Slagter, 2005) developed in the CURE-project, in particular the patterns that were added to familiarize participants with each other (USER GALLERY) and (HELLO HELLO). Our pattern was developed to foster initial interpersonal trust and thus improve interaction among virtual team members in business as well as educational settings. However, presenting identity information as a means of improving interaction has also been suggested from the perspective of workspace awareness (Dourish & Belotti, 1992; Gutwin & Greenberg, 1998, 1999, 2002). Workspace awareness involves enabling users to build knowledge about their and other users' interactions with the workspace, by providing them with information about ''who

they are working with, what they are doing, wherethey are working, when various events happen and how those events occur". Providing information about the identity of fellow system users is helping users to answer questions like ''who is participating?" and ''who is that?" (Gutwin & Greenberg, 2002, p. 420 & 421). Like a high positive interpersonal trust level among virtual team members (Corbitt, Gardiner, & Wright, 2004; Kanawattanachai & Yoo, 2005; Raes, Heijltjes, Glunk, & Roe, 2006; Walther, 2005), the sense of being aware of others is also known to be one of the mechanisms which helps to improve collaboration in a mediated setting (Gutwin & Greenberg, 1999, 2002). In this article, however, we will concentrate on the effects of a personal identity profile on fostering interpersonal trust among virtual teammembers and we will not discuss the effects oninteraction separately. The case study described is a pilot with the aim to collect feedback on the effects of the implementation and specific instantiation of an identity profile in mediated contexts on interpersonal trust. We also aim to collect feedback on the information elements that users prefer in a personal identity profile. In a next phase a new version of the profile will be developed in a participatory design process involving a large number of students. This profile will then be tested on its effects on interpersonal trust level, as well as on the interaction between project team members. This analysis is out of scope of the current article.

We will first describe the essence of the pattern 'Provide personal identity information'. Then we elaborate on the context of and the problem within the case of the European Virtual Seminar on Sustainable Development (EVS), that lead to the application of the pattern. Next we describe the implementation of the pattern within the EVS and the considerations leading to its implementation. Then we report on the means of acquiring user experiences with the implementation and the results of this evaluation. Finally, we draw some conclusions and reflect on the experiences with the implementation of the pattern.

2. Method

2.1. The pattern: ''Provide personal identity information"

The pattern: ''Provide personal identity information" aims to foster trust in mediated collaborative settings by providing information about individual team members. It is expected to have a positive effect on interpersonal trust building and the development of first impressions irrespective of the context in which the collaboration is situated (business or educational setting). The 'virtual team' as a working method is gaining popularity in both contexts. For both settings we assume that an increased interpersonal trust level within a team improves interaction and collaboration which in turn will improve work and learning processes. This does not imply

that the instantiation of the pattern will be the same in all settings. We expect that the information which should be provided within the personal profile is partially dependent on the context. The pattern was developed within the E-LEN project (2004). It was based on a literature review of collaboration and trust, and on known uses of profiles in other, non e-learning, trust-requiring contexts. So, to identify this pattern, an inductive as well as a deductive approach was combined (Baggetun et al., 2004). An abstract of the identified pattern is (Rusman, 2004):

Problem: People are not or infrequently collaborating due to a lack of trust and lack of a mental image of other people they ought to be collaborating with.

Analysis: One of the conditions of successful collaboration is the feeling of trust, mutual accountability and common ground between the members of a group. Collaboration and cooperation is much less likely when dealing with an anonymous actor. To build this relationship of trust and understanding between people, they need to get a feeling and a mental image of the kind of person they are collaborating with. One way to get such an estimate of the person you are dealing with is to provide personal identity information in the collaborative environment. Other possibilities are to provide an 'ice-breaking' activity (Kear, 2004; Salmon, 2003) or to make people aware of the issue of trust in a mediated environment by means of a training at the start of a project (Beranek, 2000). Although these solutions also have a positive effect on trust building, they delay the start of a project and do not provide a means to easily review information on which a trust estimation is based during the rest of the project.

Solution: Provide static as well as dynamic information on personal identity (Danis, 2000).

Context: Applicable to synchronous and asynchronous distributed text-oriented interaction in a collaborative environment. Mainly aimed at designers and developers of electronic groupware environments. Especially necessary when people do not know each other in advance and there are no opportunities to organise one or more face-to-face meetings to get a mental image of people.

The original pattern contains additional information on the following elements: name, category, abstract, problem, analysis, known solutions, research questions, known uses, context, references, related patterns, author and date. This complete pattern can be retrieved from: http://www2.tisip.no/E-LEN/patterns_info.php (within SIG 3, collaborative learning) (E-LEN, 2004).

2.2. The context: European virtual seminar (EVS)

The European Virtual Seminar on Sustainable Development (EVS) is one of the modules within the curriculum of the School of Environmental Science at the Open University of the Netherlands (OUNL). The OUNL is an open, distance-learning institute, offering flexible learning opportunities at university level, independent of time and place. It provides higher education opportunities for students without the usual entry qualifications or for those over the age of 27, for whom government grants for higher education are no longer available (National Committee of Inquiry in Higher Education, 1997). Its student population consists of adults, of which 65% fall within the age category of 26–45 (OUNL, 2006). In EVS the OUNL collaborates with several partner universities across Europe, whose student populations consist of adolescents (EVS, 2007) falling within the more traditional student group aged about 18–25.

The ‘‘European Virtual Seminar on Sustainable Development (EVS)” is an international and multidisciplinary ICT-mediated dialogue on issues in sustainable development between students from different universities within Europe. Problems of sustainable development are typically complex, and perspectives on the nature and solution of these problems are likely to vary with national, cultural and disciplinary background. Transboundary competence, i.e. the ability to communicate and collaborate across the boundaries of nation, culture and discipline, is an essential competence for sustainable development. In the heterogeneous student groups in EVS, students directly experience different peer perspectives during their dialogue on sustainable development issues, while trying to reach a joint solution of the problem (Cörvers, Leinders, &van Dam-Mieras, 2007). During a period of four and a half months they worked collaboratively on a case in groups of four to six students with different nationalities and from different disciplines. The group members communicated via text (chat or discussion forum) in English, which for none of the students was their mother tongue. Although chat was available, students mainly communicated asynchronously through the use of the discussion forum. The main group product is a report that presents an advice to solve the sustainable development issue they have researched. Each student group was coached by a tutor whose focus is on the group process; students can acquire additional advice on the content of the case study from an expert.

Although EVS has been running successfully since 2001 (Cörvers et al., 2007), according to the coordinator, who has been involved with EVS from the start, some interaction problems remain. One problem is that students do not communicate directly from the beginning of the project. Another problem is that they do not know what expertise and input to expect from their group members. This type of interaction problems in virtual teams are not only common within EVS, but have been detected repeatedly in a variety of virtual team settings (Häkkinen, 2004; Jarvenpaa & Leidner, 1999).

Although group members are interacting during the project and in general deliver products of high quality, the coordinator wanted to accelerate interaction, in particular in the initial phase (the first two weeks) of the project. As the characteristics of EVS largely overlap with the 'context' description of the pattern – students have no opportunities for face-to-face interaction and no future collaborative activities are planned, we set out to investigate whether the provision of personal identity information would help students to form impressions and expectations of their group members, and improve communication within EVS.

2.3. What was implemented?

We implemented a simple solution for the provision of personal identity information as suggested in the pattern (Rusman, 2004) that wasadapted from an earlier version referred to as a 'PEXPI': 'Personal expertise inventory' or 'personal identity and expertise profile' (Brouns et al., 2007; Ogg et al., 2004; Rutjens, Bitter-Rijpkema, & Crutzen, 2003). An overview of the PEXPI template is given in Table 4.1. The PEXPI provides static information about each group member. We asked each participant of EVS to fill the PEXPI-template. The PEXPI subsequently became part of their collaborative environment.

Table 4.1. The PEXPI template used in EVS

PEXPI
[A photo: please insert a picture of yourself]
Personal:
First name: Insert your first name
Family name: Insert your family name
Gender: Insert your gender (male/female)
Birthday: Insert date and year of birth
University: Insert name of your university
City and country: Insert name of city and country where you live
Contact information: Insert your e-mail adress and other relevant contact information
About me
Tell what you want to tell about yourself
Interests and hobbies
Tell what you want to tell about your non-work-related areas of interest and hobbies
Expectations of EVS
Insert what you expect of EVS
EVS availability
Tell when you can be reached for EVS work (and when you have a holiday)
Expertise areas
Tell in what areas you have expertise and how your peer EVS members can contact you on these subjects
Fields of interest
EVS issues you are interested in. Fields where you have no or not so much expertise, but in which you are interested and want to learn more
Learn and work experiences
Shortly describe your relevant prior learn and work experiences
Suggestions
Present ideas and links to webpages that are of interest to group members

2.3.1. Target group and evaluation methods

We implemented the pattern in a group of 32 EVS students. The students were divided in two groups which had no mutual contacts: students who filled in a PEXPI right from the start and students who prepared a PEXPI only after two and a half weeks. It was expected that students who could use the PEXPI right from the start would have an advantage over the students who could access it only after two and a half weeks. Unfortunately, after three weeks, five students discovered that they could not combine this course with their work for other courses they participated in. These students left, leaving 27 active students in total. As a consequence, two study groups became too small. They were discontinued and students were distributed over the remaining five study groups. Two of the five remaining groups had a PEXPI from the beginning of the project and three groups after two and half weeks. Although the initial research objective was to compare these two groups quantitatively, we had to abandon it due to the small numbers of students in each experimental group. Instead, we focussed on the information collected through the questionnaires and telephone interviews (Appendices E and F, respectively). With it we could answer the following questions:

- What information did students use to form an impression of others online rather than face-to-face? An impression is the perception of another person, concerning how behaviour, characteristics, dispositions and causes of events involving this person are perceived and interpreted (Arnold, Cooper, & Robertson, 1998).
- Was the profile implemented useful for online impression formation among students?
- What information in the profile was especially useful for online impression formation of others?
- Did students miss relevant info in the profile which would allow them to form an online impression of others?
- Would students appreciate dynamic information in the profile of their team members?

To analyse the data, we followed the approach of De Laat and Lally (2003) and Steinfield et al. (2001). They consider triangulation of a limited set of quantitative and qualitative data an approach which provides sufficient information for verification, falsification or refinement of cognitive processes and thus it is also applicable to impression formation.

2.4. Questionnaire

Two and a half weeks after the start of the project we presented an electronic questionnaire to the students. Questions were asked on the impression they had formed on their fellow students, and for those who had the PEXPI available, on the role that the PEXPI played in their project (see for the questions Appendix E). The questionnaire contained both closed and open questions but the closed questions were ignored in view of the small sample size. The answers on the open questions were coded (see first table of Appendix H) so as to gain insight in the type of information the students used to acquire an impression of a virtual team member. The coding scheme was based on research on computer-mediated impression formation and trustworthiness estimation (Jacobson, 1999; Liu & Ginther, 2001; Riegelsberger, Sasse, & McCarthy, 2004) and adapted, based on the acquired data. Information in the interview was coded with this scheme. Subsequently, coded information was reviewed on repeating constructs and repetition counts were kept. We asked students to explain how they formed an impression of the most and least trustworthy person in their team. All remarks on the information channel used to acquire this impression were counted. All information given in the answers of different students was combined and is represented in Table 4.2.

Table 4.2. Representation of open answers in questionnaire

	Info channel	Info used	Impression statements
Impression based on	chat (8), e-mail (5), discussion forum (4), PEXPI (3)	*Personal and private characteristics*: Field of study; correct English language use; expectations; interests; photo (2), *Communication style and mode*: Written opinions; writing style (4) (e.g. coherence/word use/style, e.g. nice/polite/friendly); *Behaviour*: Availability; motivates other group members; no communication; absence of input (2); takes initiative (2); cooperation/participation/behaviour (5); *Work and task-related*: Quality of input/ideas/thoughts (8); personal report (2) *Other*: Everything available (2);	Nice; polite; competent; friendly; kind; open; fair; not self-oriented; sociable; anxious
Most important info for forming an impression	First chat session (3), discussion forum (2)	*Personal and private characteristics*: Field of study; personal interests; personal hobbies; PEXPI; *Communication style and mode*: Responding on suggestions/opinions of others; written opinions (2); communication strategy (3); participation/ communication in discussions (4); frequency of communication (5); *Behaviour*: Answering on posted questions; initiative; friendliness; problem solving capability; information sharing behaviour; defensive behaviour; *Work and task-related*: Personal report; quality of input (4); dedication to the work (4)	
Missing info for forming an impression		*Personal and private characteristics*: Why he/she chose the subject that he/she studies; PEXPI; thoughts on other themes; what exactly he/she does as a job (2); social life (4); *Communication style and mode*: Body language; non-verbal communication; communication; informal talk (2); face to face contact (2) *Work and task-related*: Agenda; information if he/she is still participating in the course; information on the way of working; *Other*: Info on cultural background to make intercultural communication optimal; slide shows	

2.5. Interviews

In addition to the questionnaire, in-depth semi-structured telephone interviews were held with 13 students at the end of the project (after four and a half months). Seven of these 13 students had the availability of the PEXPI from the start of the project and six students only after two and a half weeks. They were questioned on their impression of team members and about their experience with the PEXPI (see Appendix F, for the core questions of a more elaborate scheme). Answers were coded according to the more elaborate version of the coding scheme (Appendix H), using ATLAS. ATLAS is an environment for qualitative analysis of large bodies of textual data (and also audio, video). It offers a variety of tools to accomplish the tasks associated with any systematic approach to ‘‘soft” data – i.e., material which cannot be sufficiently analyzed using formal, statistical approaches (ATLAS, 2002–2008). It supports the development of a coding scheme and the subsequent coding and analysis of qualitative data with the developed scheme.

3. Results

3.1. Questionnaire

Sixteen students responded, corresponding to a 75% response rate (gender: 69% female, 31% male; age: 56% 19–25, 31% 26–35 and 13% 36–45 years). None of the respondents knew their team members before the collaboration in EVS. After two and a half weeks the respondents had mainly communicated through means of mail, with text chat mentioned by 38% as an additional means of communication.

Table 4.2 represents the information that individuals mentioned in the answers to the open questions in the questionnaire, as well as counts of information repetitively mentioned in answers (number of times mentioned in brackets). If no brackets appear, info was just mentioned once. We sorted and ordered students’ answers in five categories of information, which emerged from the answers given in the questionnaire. Information categories which were used by students to form an impression within EVS are: (1) personal and private characteristics; (2) communication style and mode; (3) behaviour; (4) work and task-related and (5) other.

Table 4.2 represents the open answers of all 16 students who responded to the questionnaire, whether or not they had the PEXPI available. After two and a half weeks, students already formed an impression of each other. Students either used a PEXPI to derive personal or private characteristics from their team members when it was available to them. If not available, students still use all information available through the channels of mail, chat or discussion forum to construct an impression. In those cases, impression is derived from the communication style and mode, as

well as general and task-related behaviour of team members. This indicates that people have the need to form an impression of others when communicating online, independent of the fact whether they are supported by extra means, like a PEXPI.

Students also answered questions about the students that they trusted most and least in their team. They were asked whether this impression would be the same if they would have met this person face-to-face, rather than online. After two and a half weeks most students thought their impression would be different if they would have met the person whom they indicated as most or least trusted face-to-face. There was a difference between how reliable they thought their online formed impression was, dependent on their trust decision: 62% of the students thought that their impression of the student they trusted most would be different in a face-toface setting and 75% of the students thought that their impression would be different for the student whom they trusted least. They gave several explanations for the general difference between face-to-face and online formed impressions, where one explanation summarizes the different responses neatly: ''*a face-to-face situation is a much more complex encounter with a lot of factors external to the work that influence the contact. This can be positive or negative*". This indicates that, whatever source of information they used to construct their impression, students were overall more careful to depend on their impression formed of others in an online setting than they would have been in a face-to-face setting.

Differences mentioned between online and face-to-face encounters were indicated as both being positive and negative, with some people stating that they expected their impression to be more clear and unprejudiced when they only 'met' online, whereas others expressed doubt whether they could 'completely get to know another person' through mail and chat, without meeting face-to-face. One student stated:

> ''*I have the experience that people can seem very different in online communication and in real life. Not that the person is better or worse in real life, but just different*"

Other students thought that their impression would be the same, having either confidence in their judgment of human nature or basing it on the stability of response in the first phase. Students were additionally asked whether, if there would be a personal identity profile available, they would appreciate dynamic information within this profile, i.e. would like it to be updated regularly, and what info they then would appreciate. Table 4.3 summarizes the response.

Table 4.3. Display of dynamic information in profile

Appreciate dynamic info ?	What info?	Why?
Yes (63%)	Login statistics (6)	See if person is (still) active (3)
I do not care (6%)	Tasks assigned (3)	Overview of cooperation status in group (2)
No (31%)	Status of tasks assigned (3)	
	Deadlines for tasks	Gives more structure
	Appointments made and kept	Can serve as an incentive
	Cooperation status of the other groups	To determine working times of others
		Easier to manage tasks

The majority of the students had no problems with displaying dynamic information to their fellow students: 63% did not mind, 6% was indifferent, 31% objected to it. The reasons for allowing this information to be displayed varied: It was considered fair towards team members, provided they would also be able to see theirs; it was not considered as secret or sensitive information and it allowed students to see the working schedule and activity of their team members. The reasons for not wanting this information displayed were related to information considered as private and/or sensitive.

3.2. Interviews

Thirteen students were interviewed after four and a half months, seven students (from two different study groups) used the PEXPI from the start and six students (from two different study groups, see Appendix G) after two and a half weeks.

In the interview students were questioned on impression formation within their team (Appendix F). To structure the results all answers were coded with an elaborate version of the coding scheme used to analyse the open answers of the questionnaire (Appendix H). Table 4.4 reports the frequencies of the codes and example citations.

Table 4.4. Source of information used for impression formation in general

Code	Count of fragments	Example citation
Characteristics of person (direct experience during 1st encounter) (CHARPSN)	54	Student 6: "*... wrote in the beginning that she wants to make better and more clear her English. So, I'm not sure if this is the right motivation for joining EVS*" Student 1: "*first of all you only have a photo of the project members. And you have a brief description of what they are doing, what are their hobbies and what they are doing normally*"
Behaviour of person (direct experience during interaction) (BEHPSN), comprising communication as well as work-and task-related communication	209	Student 7: "*one person, he could almost never meet us in a chat session. So, (s)he did not participate too much. And the other person, we collaborated and participated a lot. We had a lot of fun chat sessions together, two or three times a week available, at least*" Student 10: "*From the beginning all members of our team were working very well. And then some problems appeared and a solution of the problems, was better with some members than the other. And so, I had to change some opinions I had from the beginning*"
Info derived from context/setting (by reasoning) (CONTXTINF)	6	Student 1: "*what we all had in common is that we are interested in the subject of sustainable development*" Student 5: "*I think we were all interested in the subject of sustainable development... we had that in common. You mean on a more personal level? Well, I think most of us were about the same age, except for one team member who is a bit older. But the rest were like in the mid to late twenties.*"

It is remarkable that information coming from other persons in the same group was not used to form an impression (code 'OP'), only a remark of a tutor was mentioned. So, reputation information seemed not to be spread actively by communication of team members within the group during the four and a half months that the project was running. Students were also asked which information was most important for impression formation. Table 4.5 represents the frequencies of information mentioned in their answers. Not all students could pinpoint the most important information for their impression formation process.

Table 4.5. Most important info for impression formation (MIMP)

First introduction	1
Behaviour and communication while working	8
Quality of work	3

3.2.1. Role of PEXPI

Seven out of the interviewed students, had the PEXPI available from the start. All seven filled in the PEXPI with personal data. Five of the six students who did not have the PEXPI at the start did not fill in the PEXPI when it became available after two- and half weeks. They did notice the template when it became available. One student filled in the template. His profile was read by his two team members who were interviewed and they both referred in the interview to information which they read in this template, especially related to work experience. All the students who had the PEXPI from the start did read the PEXPIs from their colleagues, and four of them read them more than once, during the project. With one exception, students who had the PEXPI available from the start found it useful for impression formation. The one who did not find it useful, stated that it provided only basic information of others, and that more detailed information was needed to base an impression on. An example statement, reflecting the general tendency of usefulness within the student interviews:

> ''*It [the PEXPI] is the only idea that you have of your team members.... It is the only way that you can get a kind of personal bond with them and see what they look like and to form an impression of what kind of person they are*"
> (student 2, part 2, 19.37).

Half of the group of students who did not have the PEXPI available from the start indicated that it would have been useful. Two other students of this group indicated that they would have used it if it would have been there in the beginning of the project, but that after two and a half weeks they already formed an impression based on the interaction with their group members. One of the student's who did not have a PEXPI available to him from the start searched the web for personal data

of the team to find ‘‘*more information about education and hobbies and some opinions of team members* (student 10)”.

3.2.2. Info available in PEXPI

None of the information in the PEXPI was considered irrelevant. Students did not necessarily want extra information to be added to the PEXPI, although some suggestions for additional information categories were given. Table 4.6 represents the information categories that were considered as the most relevant and important information for impression formation. The information which was available in the PEXPI is marked with an (*).

Table 4.6. Most relevant information for impression formation

Educational background (∗)	8
Non-work/study related personal information (∗) (e.g. spare time activities; what they like, e.g. music, hobbies)	6
Photo (∗)	5
Professional background/working experience (∗)	3
Age (∗)	2
Gender (∗)	2
Affiliation (university, organization) (∗)	2
Expectation of course (∗)	2
Country, living place (∗)	2
Future plans, activities/professional aspirations and inspirations	2
Opinions on, for task relevant, topics	1
Motivation for course (∗)	1
Name (∗)	1

The opinion on the addition of dynamic information differed among students. Five students did not want dynamic information to be added and three students favoured the idea. The other students were neutral. Arguments mentioned for the inclusion of dynamic information were expectancies of improvement of the working process and a sense of shared responsibility through the visibility of availability and log-in behaviour. Arguments mentioned against inclusion were expectancies of an increase in competitive behaviour and students acting like a ‘police officer’, while the purpose was to co-operate in a team instead of competing. Also a sense of ‘big brother watching you’ was mentioned against the display of dynamic information.

Some pre-planned chat sessions were mentioned several times in the tips to improve the course, mainly because it would allow talk on a more personal level, next to work-related communication. But, also the danger that important things would have been posted there and got lost, was mentioned here. This could be prevented by recording these chat logs, so that nothing gets lost.

4. Discussion and conclusions

Students will construct an image of each other, whether they initially have a profile available or not. If no profile is available in the initial phase, they will ground their impression in whatever information is available about their team members, e.g., their communication style and their on- and off-task behaviour. But, a PEXPI can be a helpful tool to support this initial impression formation process. When available, all interviewed students used it in the beginning phase of the project: they filled it in as well read the descriptions of their team members. When the PEXPI was not available to students, they indicate they would have liked to have it in the initial phase of the project. When if came available after two and a half weeks, it was not considered useful anymore and the majority of those students did not fill in the PEXPI at that time. It seems that students have a need for personal information of each other to form an impression. This was also emphasized by the fact that some suggested an informal chat session at the beginning of the project, to exchange this kind of information. After the initial phase, personal characteristics are still important to form an impression of others, but the behaviour and communication style of people will become more important determining factors for the impression. So, presenting static personal information in a profile is especially useful in the beginning phase of a project.

Unfortunately, the case study encompassed relatively small numbers of students. Nevertheless, for an exploration of the usefulness and the effect of an implemented design pattern, the combination of an explorative questionnaire followed up by in-depth interviews, did provide insights. To enable the evaluation of a pattern, qualitative information methods seem to be more valuable in order to acquire useful information regarding the effects of a pattern. The pattern was easy applicable to the context of this case study, due to its description of contextual conditions and action oriented nature. The context description made it possible to judge if this pattern would be suitable for the problems within this specific case, the European Virtual Seminar on Sustainable Development (EVS). Remember that in it students do not know each other in advance, do not have the opportunity to meet and mainly communicate text-based. These characteristics of the context are important restricting elements of the pattern, as in face-to-face teams students will have different channels and more opportunities to acquire information to form an impression of their team members (e.g., at the coffee machine) and are therefore not so much in need of a profile.

Student responses indicate that the relatively simple and inexpensive implementation of a profile, such as PEXPI, did meet a need of students within EVS. It helped them to get to know more about their team members before and during collaboration. Results also indicate that the PEXPI was repeatedly read by some members and referred to by all who had it available to them. From these results, it

seems that a PEXPI is especially useful and relevant to form an image of the people in the beginning of a project. The majority of students who only had access to a PEXPI after two and a half weeks of collaboration did not use it anymore, but indicated that they would have found it very useful had they had it from the start of the project. Although we do not have hard evidence that the implementation of this pattern increased interaction and participation within this exploratory case study of the EVS, it seemed to have helped students to form an initial image of their fellow team members. Admittedly, the questionnaire and the interviews also indicate that within two and a half weeks the students without a PEXPI also formed a basic impression of their team members, based on information exchanged in messages. This indicates that students will form an impression in any case from all available information. Nevertheless, also these students indicated that a PEXPI would have been useful in the first phase of the project. As time passes, irrespective of whether or not they initially had a PEXPI at their disposal, students seem to form their impression mainly on perceived behaviour, communication style, and mode and quality of work of their team members during the project. Based on the experience from this case study, an addition to the context factor of the original pattern 'Provide personal identity information' can be made: the usefulness and effectiveness of the solution offered in the pattern should be restricted especially to the initial phase of a computer-mediated collaborative project.

Students did not miss information in the current PEXPI, but small changes can be made to the template on the basis of their suggestions. The addition of two categories of information was recommended: 'opinions on task relevant topics' and 'future professional plans, activities, aspirations and inspirations'. All information-categories in the PEXPI were considered relevant. The most important and relevant information was 'educational background', 'nonwork/study related personal information' (e.g., spare time activities; what they like, e.g., music, hobbies), the photo and their professional background/working experience.

Student opinions were divided on the topic of the representation of dynamic information, both in the questionnaire and in the interviews. An addition to the 'solution' element of the original pattern description can be recommended. Static information representation can be mentioned as a cheap, easy to implement and working solution, whereas some extra notes and discussion of the possible advantages (e.g., see if and when a person is active to find overlapping working times, easier to manage task and collaborative process) and disadvantages (expectancies of an increase in competitive behaviour, students acting like a 'police officer', a sense of 'big brother watching you') of dynamic individual identity information display can be added. Also an additional argument for providing identity information, from the perspective of the awareness theory, can be made. It further seems that users do not necessarily need to have dynamic information of each individual explicitly displayed in order to form an impression, as they naturally derive this information

automatically from the context and the communication behaviour of their team members. Also a reference to a possible new pattern, the dynamic information display on group level, instead on personal level, to make dynamic information display less threatening for individuals, can be made to the original pattern. This new pattern would have a different underlying objective: Instead of supporting initial trust estimations and impression formation it would be aimed at the support of management and co-ordination of virtual team work by providing awareness support for group activities.

Although students indicate that they have formed an impression of fellow students in an online setting, the majority still expects that their impression will be different when they meet team members face-to-face. Further investigation on the effect of the PEXPI on perceived trustworthiness and participation in the initial phases of collaboration within virtual teams is needed. Additionally, it would be interesting to study the factors – within the categories of behaviour, communication, and work and task-related information – that contribute most to the impression formed in a mediated collaborative setting.

Concluding, the design pattern allowed transfer of design knowledge from one context to another and supported online impression formation in the initial phases of a virtual project team. The pattern was evaluated by means of a case study in an 'educational setting'. This resulted in a personal identity profile that contained some information elements that are relevant to learning contexts in particular, e.g., 'field of interest' and 'suggestions'. But, the pattern of 'presenting personal identity information' as such, should also be applicable to business settings.

Knowledge which was gathered and integrated from different disciplines and case studies became practically available through the design pattern format and, through it's action-oriented nature, could be easily used and transferred to another case study. The format of a design pattern and especially the 'context' element allowed the designers to judge if the pattern was applicable to this context. The implementation of the pattern did not need to be complex to sort an effect. The implementation of only part of the solution provided in the pattern, a static profile description, already realized the objectives strived for. The PEXPI can be included as an example in the pattern description. Based on the experiences from this case study, some extra additions to the pattern, concerning dynamic information representation, can be recommended. We also learned that users especially value the implementation, in the form of a PEXPI, within two and a half weeks from the start of a collaborative project. These findings contribute to the refinement of the original pattern.

Thus, the case study provided useful evaluative information regarding the pattern, and allowed the refinement of the existing pattern on several key aspects. It also provided a 'core idea' for a new pattern: the presentation of interactive information on group level instead on a personal level, in order to prevent objections

regarding personal privacy. The case study proved itself as a useful method to identify and evaluate a new design pattern. Looking at scenarios as abstractions derived from experience in real case studies Retalis et al. (2006) also pointed to the use of case studies not only for pattern evaluation but also for pattern identification purposes. However, the organization and run of a 'real' case study is a rather time-consuming enterprise that is best restricted to design patterns that have already been evaluated by means of the shepharding process.

Chapter 5

Can I trust you? – Profile elements that inform first impressions of trustworthiness in virtual project teams

Rusman, E., Van Bruggen, J., Sloep, P. B., Valcke, M., & Koper, R. Can I Trust You? (2011). Profile Elements that Inform First Impressions of Trustworthiness in Virtual Project Teams. *International Journal of Information Technology Project Management (IJITPM), 2*(4).

Abstract

This explorative study identifies information elements that are commonly perceived as important to inform initial trustworthiness assessments of colleagues within virtual project teams. Collaboration in virtual project teams heavily relies on interpersonal trust, for which perceived trustworthiness is an important determinant. Knowing what information elements are used to form a first impression of trustworthiness, one can optimize the design of personal profiles so that they support trustworthiness assessments in virtual project teams. We reviewed various trust-requiring online environments to determine what elements were available through profile templates. A group of 226 students with experience in virtual project teams indicated the importance of the elements thus found for the formation of a first impression of trustworthiness. On the basis of the results obtained we formulated recommendations for the design of personal identity profiles in groupware environments.

Distrust any enterprise that requires new clothes. (Henry David Thoreau).

1. Introduction

Virtual project teams are increasingly looked upon as a format for collaboratively solving complex and knowledge-intensive projects, within and between companies as well as in (inter)national non-profit organizations (Finholt, 2002; Perry, 2008). Several different notions of a virtual project team have been used in previous research (Dubé & Paré, 2004). Here we understand it to be an organizational form which is assembled on an as-needed basis for the duration of a project and staffed by two or more members across spatial, temporal, cultural and/or organizational boundaries (Hung, Dennis & Robert, 2004; Powell, Piccoli & Ives, 2004). In these types of projects teams members sporadically meet in person; they communicate via ICT (e.g., e-mail, chat, video-and/or audio-conferencing); they may not have a prior history of working together and may never meet in the future (Hung et al., 2004; Jarvenpaa & Leidner, 1998).

It is broadly acknowledged that a positive level of interpersonal trust between team members within such virtual project teams benefits collaboration and communication (Corbitt, Gardiner & Wright, 2004; Gambetta, 1988; Jarvenpaa, Knoll, & Leidner, 1998; Jarvenpaa & Leidner, 1998; Jarvenpaa, Shaw, & Staples, 2004). In contrast, when there is a lack of trust, team members spend considerable time monitoring each other, backing-up or duplicating work, and documenting problems (Wilson, Straus, & McEvily, 2006).

Perceived trustworthiness is an important factor influencing overall interpersonal trust, next to a persons trust propensity, situational characteristics (e.g., perceived risk, task complexity, social control mechanisms) and the mood of a person at the time of trust formation (Castelfranchi & Falcone, 1999; Riegelsberger, 2005; Rousseau, Sitkin, Burt, & Camerer, 1998). The extent to which a person (the trustor) trusts a team member (the trustee) to perform adequately is the trustee's perceived trustworthiness (Hardin, 2002). In face-to-face settings, people base their first impression of each other's trustworthiness on different types of signals (perceived features of objects or events which can indicate the presence of non-observable properties) received through different routes (Bacharach & Gambetta, 1997; Donath, 2006, 2007). A person can obtain information that signals such properties via direct encounters with another person as well as via reputational information via a connection (Olson & Olson, 2000b; Riegelsberger, 2005). Once these signals are used to reveal a certain perceived property of another, they become cues for that property. In mediated settings signals and routes are not abundantly available, but people nevertheless form a rather persistent impression based on any information

they collect (Cooper, Bott, & Wallace, 1999; Hancock & Dunham, 2001; Walther, 1995, 2005; Zolin, Hinds, Fruchter, & Levitt, 2002).

Initial models for impression formation in mediated settings assumed a severely hampered and depersonalized communication process (Short, Williams, & Christy, 1976; Siegel, Dubrovsky, Kiesler, & McGuire, 1986). Subsequent research has shown that only the process of forming an impression is slowed down (Walther, 1993, 1995, 1996). In addition, when information about others is sparse, people tend to over-attribute properties of an other, leading to a hyperpersonal image, which is more intense on a few properties, but less broadly based on others (Hancock & Dunham, 2001). These results show that the cognitive need to form an impression of others is undiminished in mediated settings. People use any type of information source in any way they can in order to form an initial impression (Lea & Spears, 1995; Liu & Ginther, 2001; Postmes, Haslam, & Swaab, 2005; Walther, 2005); all observations done hereafter are coloured by this perception, indeed, people even avoid to search for disconfirming information (Good & Gambetta, 1988; Petty & Cacioppo, 1986; Robert, Dennis, & Hung, 2009).

Extensive research has been done on the influence of information modality (e.g., text, video, audio) and richness (Daft & Lengel, 1986) on trust formation (Bos, Olson, Gergle, Olson, & Wright, 2002; Olson & Olson, 2000a,b). Nevertheless, it remains unclear what specific categories of information transmitted in these differently encoded messages 'do the trick' in professional settings. Several methods are used to support initial impression formation. Most make personal background and social information available, for example through story-telling, role-playing games, team-building exercises, personal profiles and elements in training. Even though they all have been found to support trust formation (Bacharach & Gambetta, 1997; Feng, Lazar, & Preece, 2004; Hung et al., 2004; Kanawattanachai & Yoo, 2005; Rusman, van Bruggen, Cörvers, Sloep, & Koper, 2009; Zolin, Fruchter, & Hinds, 2003), we do not really know what specific categories of information people are looking for in professional contexts to determine whether someone is able, honest, incorruptible, consistent, responsible and so on, i.e. to make a best guess of someone's trustworthiness (Macrae & Bodenhausen, 2001; Mayer, Davis, & Schoorman, 1995; Rusman, van Bruggen, Sloep, & Koper, 2010). As Walther et al. formulate it: "It is relatively well documented that people use information provided to them online to make judgments about others. What is less known is what kinds of information are used to make what judgments"(p.45) (Walther, Van der Heide, Kim, Westerman, & Tong, 2008).

We do know that a first impression is especially important to accelerate trust formation in the initial phases of a virtual project team, prior to or during initial interactions (Jarvenpaa et al., 2004; Zolin, Hinds, Fruchter, & Levitt, 2004). People try to guess their counterpart's trustworthiness by making a 'best guess' from the information they have available. It thus is imperative to offer the most supportive as

well as parsimonious information, to try and meet the common information need of virtual team members.

One way to provide this information is through a personal identity profile which contains static or dynamic information on a person's identity (Danis, 2000). Some research has been done on profile elements of which a profile template is composed (Berlanga, Bitter-Rijpkema, Brouns, Sloep, & Fetter, 2011; Boyd & Heer, 2006; Lampe, Ellison, & Steinfield, 2007; Lee, Girgensohn, & Zhang, 2002; Ten Kate, 2009). This research was mainly situated within the context of Social Network Sites (SNS). Furthermore, they all studied fixed profile templates, in which certain pre-selected profile elements were available. In these settings, the decision to include a profile element in a profile template was predominantly made by a designer. We are, at the moment of writing, unaware of any research which focuses on the selection of profile elements by potential end-users to support initial trustworthiness assessments within virtual project teams.

Recently, researchers have also devoted attention to information available in profiles or on personal websites (Marcus, Machilek, & Schütz, 2006; Vazire & Gosling, 2004), and the effect of information on impression management and impression formation processes in computer-mediated communication. The studies, which focused on profiles, were also mainly carried out in the context of various SNS including dating (Ellison, Heino, & Gibbs, 2006; Hancock & Toma, 2009; Toma, 2010), as well as private and professional contexts (Walther, Van Der Heide, Hamel, & Shulman, 2009; Walther et al., 2008).

A common thing in this research is the use of instantiated profiles (examples of which one can find in SNSs such as Facebook and LinkedIn) to study impression formation processes: specific profile content, supported by a fixed profile template, related to a real or simulated person. These studies do not look at the selection of profile elements of which profile templates consist. By addressing this gap, we seek to extend both research on the impression formation processes as well as groupware design. Profile elements are chosen from a large collection of information elements that could be used to describe a person. Information elements are small containers for data about a person. A subset of them is included in a profile template and structured in a standardized format, thus becoming profile elements. An example of a common profile element is 'date of birth', its content could be '1st of January 2010'. Another example is 'job title', its content could be 'plumber'. Profile elements encourage the provision of certain profile content. By using instantiated profiles such as the object of study, it is very difficult to distinguish between the effects of specific profile content and the containers of information stimulating the provision of this information, namely the profile elements.

This article presents an explorative study which aims to identify the specific information elements that are commonly perceived as beneficial and useful in the initial phases of a virtual project, when it is necessary to determine whether a col-

league is trustworthy. If we know what type of information elements are generally preferred to assess trustworthiness in the initial stage of a virtual project, we can take this into account while designing artifacts or methods, such as a personal identity profile. It is one step in a series to research the hypothesis that information elements, which signal antecedents of trustworthiness, are preferred by most virtual team members. Although individuals each use different, implicit personality theories to attribute characteristics to another person (Arnold et al., 1998), we assume overlap in the information used for these attributions. We are interested in the categories of information most people use to form an opinion, rather than in the opinion of a specific person. By presenting a well-informed selection of profile elements within a profile template, we can accommodate profile content by design. Specific profile elements will encourage particular profile content. This is in line with design-oriented research done on communication-support templates which were successfully used to improve communication (Remidez, Stam, & Laffey, 2007). The profile templates that result from our research should contain all information elements which support trustworthiness assessments. Please note that this does not guarantee that people who fill out these profile templates will deem each other trustworthy. They are rather optimally supported to make such an initial trustworthiness assessment.
Concluding, in this study we seek an answer to the following questions:

1. What type of profile elements are currently made available by system designers to inform initial assessments of trustworthiness in existing high-trust-requiring environments?
2. What type of information elements do users consider important to inform an initial assessment of trustworthiness in a virtual project team?
3. What type of information elements do users consider as practical for collaboration in a virtual project team?
4. Which information elements should become part of a profile template that is designed to support trustworthiness assessments in the initial phases of a virtual project team?

2. Method

In order to generate an extensive list with information elements that could potentially support initial trustworthiness assessments, we reviewed profile templates available within various existing high-trust-requiring-online environments. This list served as an enabler for the second part of this explorative study, in which students with virtual project team experience were asked to indicate the importance of profile elements to support initial trustworthiness assessments. They had to project

themselves in an imaginary virtual project team setting and indicate the relative importance of different information elements for their assessments. By asking a relatively large group of people with virtual project team experience (n=226), we try to find communalities between the perceived importance of information elements to inform initial assessments of trustworthiness within virtual project teams.

2.1. Analysis of high-trust-requiring online and groupware environments

We first identified several online environments where people interact as individuals on an equal footing, and where trust is an important factor for enabling this interaction. We selected environments where one may presume that people do not yet know each other and thus depend on information provided in a profile to form a first impression, prior to or during initial interactions. The selection criteria ('equal' individuals; trust facilitator of interaction; no prior knowledge of other; profile supportive for (online) identity formation) were chosen as they represent similar characteristics as can be seen in virtual teams, only the objectives for interaction differ across the contexts. We did not restrict our observations only to professional environments, as research on virtual project teams indicates that more personal and social-oriented information is likely to have a positive influence on trust formation (Wilson et al., 2006).

This part of the explorative study was meant to generate an elaborate list with profile elements available in the standardized profile templates within those environments. It was expected that profile elements would differ across contexts, although they all served to support an initial impression of another in these high-trust-requiring environments. Profile elements provided in privately-oriented trust-requiring contexts would probably be different than in professional contexts. Table 5.1 represents the high-trust-requiring environments we selected for our observations. For each environment we specified for what objectives people seek interaction and what risks they run, which then need to be overcome by trusting others in these environments.

Table 5.1. Inventory of high-trust-requiring online environments

	Aim of Individual	Risk	Observations in:
Dating	Find a suitable partner, find a friend	Encountering 'wrong' people, leading to harassments	www.match.com www.makefriendsonline.com
Buying/selling	Buy or sell something	**selling**: don't get payment for your goods; **buying**: don't get your goods or get rubbish	www.ebay.com
Couch exchange	Stay in the house of an unknown host/host an unknown visitor	**as a guest**: visit might be unpleasant or even dangerous; **as the host:** visitor might be unpleasant, dangerous or prone to theft	www.couchsurfing.com
Social networking	Link to people in a network in order to communicate, get recommendations or get informed on various shared interests (e.g., activities, photo's etc.)	harassment by unknown people (connections in the xth grade)	www.linkedin.com (network for professionals); www.hyves.nl (network for friends); www.facebook.com (mixed user group); http://elgg.net (educational professionals)
Recruitment	Find suitable people for a job; find a job	Hire incompetent or non-existing employees; except a job at an non-existent and financial distrustful organization	www.monsterboard.nl; www.reputator.net; www.aupair-world.nl

We also analysed profiles within several groupware and professional environments (Table 5.2).

Table 5.2. Inventory of groupware and professional environments

Environment	Description	References
Moodle	An open source course management system designed to help educators create online learning communities	http://moodle.org
Future Learning Environment	FLE is server software for computer supported collaborative learning	http://fle3.uiah.fi
EGroupware	Free enterprise ready groupware	http://www.egroupware.org
PhPGroupware	Multi-user groupware suite	http://www.phpgroupware.org
Pexpi	Personal expertise template used within several OUNL distance courses	(Berlanga et al., 2011; Ogg et al., 2004; Rusman et al., 2009)
Who is who	Template for employee overview within OUNL (internal view)	http://www.ou.nl/eCache/DEF/85.html (external view)

Within each of these 17 environments we identified the information elements which were available in the personal identity profiles and could be used to form a first impression of trustworthiness. Thus, we obtained a list with all information elements we found within these different contexts (Appendix I), as well as a count of the commonly used information elements across these environments (see 'results' section).

2.2. Survey on relevance of information for a first impression of trustworthiness

Using the list with profile elements obtained by observing high-trust-requiring environments as our starting point, we set up a survey by means of a structured questionnaire at the Ghent University, Belgium. The objective of this survey was to determine which information elements respondents considered most important to inform initial trustworthiness assessments in the context of virtual project teams. We were especially interested in the information elements they identified as most important for their trustworthiness assessment and their common preferences of information elements.

2.3. Participants

Data were collected among bachelor level students, enrolled in the Educational Sciences programme at the Ghent University, as a part of their acquaintance with doing research. Thus, a convenience sample of 226 respondents (mean age = 18,2 years, SD= 1,85) was obtained, 93% of which were female and 7% male. 99 % of the respondents had previous experience with collaboration in a face-to-face project team, either in a (part-time) job or during their study. 95 % had previous experience with collaboration in a virtual project team, so they could therefore project oneself in an imaginative virtual project team. Earlier in their curriculum, students used the environment Claroline (http://www.claroline.net) to collaborate and make assignments within virtual project teams, which were composed randomly by the tutor. Many students within these groups did not meet before, due to a large cohort of students, and mainly collaborated online. 88% of the respondents had experience with online conversations with people they had never met before. The majority of these online conversations took place via text-based media only, either via sec chat and/or e-mail (78%) or in combination with SMS (9%).

2.4. Materials

The questionnaire contained open-, as well as close-end questions in the respondents native tongue (Dutch): twelve in total (Appendix I). Open-end questions referred to background variables of respondents, such as age, as well as the descrip-

tion of experiences and explanation of responses. Participants were also asked in an open brainstorm question to think of at least 15 information elements they would value most to form a first impression of a virtual project team member. Here we report on the results of the subsequent close-end questions only (see question 8 and 9 of Appendix I). These questions referred to rating the importance of potentially available information elements in a pre-defined list, as well as their usefulness for collaborative purposes. Respondents valued 'empty' information elements: no specific characteristics of a person were provided in the elements presented in the questionnaire. The questionnaire solely contained the name of an information element and where applicable, an additional description was provided.

2.5. Procedure

Preceding the completion of the questionnaire, participants received a short presentation that clarified our definition of virtual project teams, showed examples of them, and discussed the role of interpersonal trust for collaboration and the objectives of the questionnaire. We also explained the way items had to be scored, which was again described in the questionnaire. Respondents were told that the responses to this questionnaire would be kept anonymous and that it would take about 30 minutes to complete the close-end questions of the questionnaire.

Prior to rating the information elements, respondents were prompted by a scenario in the questionnaire that described them as a member of a new European project, which required them to collaborate in a virtual project team (Appendix I). They were asked to imagine that they were part of this virtual team and told that, within two weeks from the start of the project, they had to form a first impression of their team members' trustworthiness. They could determine what information (from a pre-defined list) they would have available within the profiles of their team members. This could be done by rating the information on importance for forming a first impression of trustworthiness. Respondents were then asked to rate information elements on a 5-point Likert scale: (1) Definitely not important, (2) Not important, (3) Neutral, (4) Important, (5) Definitely important.

Furthermore, respondents were additionally asked to indicate per information element if they thought the information would be of practical use for collaboration in a virtual project team. This could be done by ticking a box. An empty box was rates as (0) Not useful and a ticked box as (1) Useful. As we are interested in the design of a profile template optimally supporting initial trustworthiness assessments as well as collaboration within a virtual project team, it is also useful to know which elements are perceived relevant from a practical perspective.

3. Results

3.1. List of information elements derived from high-trust-requiring environments

Based on the analysis of profiles within high-trust-requiring online environments as well as groupware environments, we extracted a list of 154 information elements. This list could be divided in static (unchangeable) as well as dynamic (changeable, based on behaviour) information elements (Danis, 2000). All elements became part of the answer options of the survey (Appendix I) and served as an enabler for the subsequent survey. We also checked which information elements were available across eight or more environments, thus indicating what designers of high-trust-requiring environments commonly considered important profile elements to include in a profile template. This resulted in the following list with overlapping elements across these environments:

- Name (first and surname)
- Pseudonym (alias/display name)
- Photo
- Personal description/about me
- Age/date of birth
- Reference to personal URL (blog, website, homepage)
- Contact data (business/private)
- Contact method
- Location data (business/private)
- Occupation/function/position/role
- Company/organization/employer
- Education
- Interests (private/professional)
- Languages (level, preferred language for communication)
- Testimonials (references, info from others about person).

These information elements largely overlap with the information elements found by Berlanga et al. (2011) while looking at three well-known social network sites.

3.2. Important information elements to inform initial trustworthiness assessments

For all information elements rated, their mean importance and standard deviation was calculated based on the respondents' scores. Missing values were not taken into account. Mean values equal or higher then 4 were considered as an indication that they were commonly considered important for the formation of a first impression of trustworthiness within the group, whereas mean values equal or lower then 2 were considered unimportant. We rounded all figures to two decimals. Most SD's

were less than 1, still either indicating scores of 'neutral or definitely important' in case of the important elements and 'definitely not important or neutral' in case of the least important elements. Thus, we identified a list with 23 information elements generally considered important for the formation of a first impression of trustworthiness. Tables 5.3 and 5.4 provide an overview of the information elements which are perceived as most and least important to inform an initial assessment of trustworthiness within a virtual project team.

Table 5.3. Most important information elements
((1) Definitely not important, (2) Not important, (3) Neutral, (4) Important, (5) Definitely important))
(□*) = dynamic information element

Information element	Description	**N**	**Mean**	**SD**
Personal motivation for project		221	4.52	.58
Ideas for project	Thoughts, opinions, insights and plans for project	221	4.51	.64
Reason why you are selected to participate in project		222	4.47	.57
Expectation of project		223	4.35	.71
I would like to work in the following type of situation(s) ..., because …	Preference and motivation for working in specific situation(s) within the project	220	4.34	.66
I would like to work on this part of the project …, because …	Preference and motivation for working on a specific part of the project	222	4.32	.77
Project aims	That which someone strives for within the project from a personal belief and ambition	224	4.32	.81
Project time capacity	Number of hours someone has available for the work that needs to be done within the project	218	4.32	.81
Ways I want to contribute to project	Ideas about potential personal contributions to the project	216	4.31	.60
Previous work experience	List of jobs and functions held	219	4.26	.76
Availability during project	Insight in availability during project, e.g., by showing regular office days/hours, planned holidays and/or planned time spans to work on the project	219	4.24	.83
Personality traits	Summary of important properties and personality traits of a person	222	4.24	.85

Information element	Description	**N**	**Mean**	**SD**
Description of relevant work experience	Particulars and characteristics of previously acquired work experience in relation to for the project indispensable competencies	223	4.23	.69
Description education/training	Particulars and characteristics of educational programs/courses followed in relation to for the project indispensable competencies	223	4.20	.84
Managerial work experience	Previous experience with management	218	4.18	.76
Expertise	Areas someone is able and specialized in	217	4.18	.84
Expectation of others within project	Anticipation on future behavior, rules of conduct, contributions of and interactions with team members within project	217	4.16	.74
Language and language proficiency		214	4.09	.84
Appointments made and follow up*	Overview of appointments, with whom they were made, and the status of follow up	219	4.09	.87
Contact data (office)	For example e-mail, (mobile) phone, fax, address (office nr., street, zipcode, skype/msn/ICQ/Yahoo, pager	215	4.06	1.05
Task list with all deadlines, planned and realized tasks within project*	Overview of all tasks, deadlines and status of tasks a project member is responsible for	219	4.05	.84
Preference for role within project	Preferred role with related tasks and responsibilities within the project	217	4.03	.81
Preferred language for communication within project		213	4.00	.95

Table 5.4 shows elements that were included in profile templates within high-trust-requiring environments, but which were considered not important for initial trustworthiness assessments within the context of virtual project teams.

Table 5.4. Least important information elements
((1) Definitely not important, (2) Not important, (3) Neutral, (4) Important, (5) Definitely important))

Information element	Description	N	Mean	SD
Pseudonym/alias		220	2.05	1.09
Body art		223	2.01	1.14
Daily eating habits		225	1.96	1.03
Favorite spot	Favorite place of a person	220	1.85	.98
Physical stature	Figure and pose of a person	223	1.81	.97
Domestic animal/pet		224	1.68	.98
Hair	e.g., color, model, length	224	1.60	.87
Eyes	e.g., color, shape	224	1.57	.87
Weight		224	1.49	.70
Length		223	1.47	.70
Sign of the zodiac		220	1.46	.87

Table 5.5 provides an overview of the scores for the information elements which were commonly considered as practical for collaboration, employing a threshold of 0.4 for inclusion.

Table 5.5. Most practical useful information elements
((0) not useful, (1) useful) (□*) = dynamic information element

Information element	Description	N	Mean	SD
Availability during project	Insight in availability during project, e.g., by showing regular office days/hours, planned holidays and/or planned time spans to work on the project	225	.44	.50
Contact data (office)	For example e-mail, (mobile) phone, fax, address (office nr., street, postcode, Skype/msn/ICQ/Yahoo, pager	221	.434	.50
Project time capacity	Number of hours someone has available for the work that needs to be done within the project	225	.42	.50
Preferred medium for contact during project	Personal preference for contact media, e.g., via mail, Skype, etc.	221	.42	.49
Local time at location of team member*	Time at the residence of a team member. Through time zones, time is dependent on location on the globe.	226	.41	.49
Language and language proficiency		223	.40	.49

4. Conclusion

The current study provides insight in what information elements are commonly perceived as important to inform assessments of trustworthiness in virtual project teams, prior or during initial interactions. The focus of this study was on the information element as a 'container' for information, rather than on specific information provided by a person. Based on a list with profile elements which are available in existing high-trust-requiring online environments, we derived a set of important information elements by querying a group of students with virtual project team experience. We assumed an equal and not a hierarchical relation between project team members within the imaginary project team, as the latter might affect the type of information a person is looking for (Albrecht, 2002; Schoorman, Mayer, & Davis, 2007).

Our first research question focused on the identification of information which is made available by system designers within profiles across seventeen, very different, trust-requiring situations. The results show fifteen information elements which are universally present across those contexts, as well as 154 very diverse information elements, ranging from information on someone's zodiac sign to professional interests and activities (Appendix I). This high diversity in the type of information elements used in profile templates, shows that the type of information elements which are seen as important by designers, largely depend on the context of the trust-requiring situations and the aim for which the environment is developed; the importance of an element is dependent on the context in which it is supplied. However, while restricting ourselves to information elements available within groupware and professional environments, there was still a wide range of elements made available. This suggests that even designers within a similar type of context hold different views, implicit as they may be, on what information elements users need to interact within a trust-requiring-professional context. The remaining common information elements which were available across more than eight environments seem to mainly serve identification and practical purposes, with the exception perhaps of such elements as 'personal description', 'occupation', 'education', 'interests' and 'testimonials'. Overall, this first exploration of information elements provided a basis for the second part of the study as well as an indication, that it would indeed be useful to look at a common preference for particular information elements among virtual project team members, the end-users, to guide design decisions.

The second question focused on which information elements were perceived as important to inform an initial assessment of trustworthiness in a virtual project team, independent of the type of medium by which information was transmitted as well as of specific, instantiated information related to a person. Making use of large-scale-participatory-design approach with students with virtual project team experience, we identified a list of twenty-three important information elements, the se-

lection having been made on content-related, not media-related, considerations only (Table 5.3). Moreover, information elements, for example someone's zodiac sign or pet, which were included in profile templates in more privately-oriented contexts such as dating, were identified as irrelevant for the formation of an initial impression of trustworthiness in a professional collaborative context (Table 5.4). This does not mean that they are irrelevant for trustworthiness assessments in the more privately-oriented contexts. Looking at the list of results with twenty-three information elements, respondents seem to be more interested in information elements that signal characteristics which are more aimed at trustworthiness in a professional context, such as a trustee's ability, motivation and availability. Although we expected that more personally-oriented information would also be important for initial impression information in professional settings, the results do not confirm this expectation. If more personal information is needed, it is in almost all cases related to the professional context. Examples are someone's preference and motivation or someone's project–related, personal beliefs and ambitions.

Furthermore, respondents seem to simply assume that basic information on the identity of the other, such as a name, photo etc., are available, since they do not indicate these information elements as important for the determination of trustworthiness. Interestingly, the list with commonly preferred information elements to inform initial trustworthiness assessments is almost completely different to the list with information elements provided by system designers across various high-trust-requiring environments. The list also shows that only few dynamic information elements, that display behaviour, are selected and seen as important for the formation of a first impression of trustworthiness. This corresponds to what we found in a first explorative study (Rusman et al., 2009), in which we researched whether the availability of information in a profile positively affected the formation of a trustworthiness impression. There and then we determined which information was made available in the profile. Results indicated that the availability of information helped people to form an impression, as well as aided their collaboration.

In this study, qualitative data indicated that people were divided over the display of dynamic data, mentioning pros as well as cons, such as a sense of shared responsibility as well as the sense that 'big brother is watching you'. In the current study we did not specifically ask them to explain their responses in relation to the dynamic information. The de-emphasis of dynamic information in the current study could also be related to the fact that our window of research only covered the first two weeks. In such a short period of time little dynamic information, based on user behaviour, would have become available.

Our third question focused on what information virtual project team members commonly see as practical for collaboration. Here we see that the results are almost all related to an insight in the availability of the other, and in the language and methods with which people can contact each other (Table 5.5). Some of the infor-

mation elements overlap with the important information elements from the previous question. Individual information elements can thus have multiple functions.

Our fourth question addressed the selection of information elements for a profile template designed to inform initial trustworthiness assessments in a virtual project team. We would advice profile designers as well as project team leaders to use the information elements, which were indicated frequently across respondents as important to inform first impressions of trustworthiness. They can be used to guide profile template design as well as function as a guideline to structure other forms of communication within 'fresh' virtual project teams. They can be complemented by the elements we observed across high-trust-requiring environments, for identification purposes, and the elements which were indicated as practically relevant within virtual project team settings. We have summarized the profile elements found across all high-trust-requiring environments, those that were rated as important to inform initial trustworthiness assessments and the ones judged as practical (Appendix J), together forming a mainly end-user-determined-profile template. This template consists of thirty-five profile elements, which can be used by designers and project team leaders to aid their design and management activities.

A limitation of the current study may be its transferability to other settings, as this study was carried out by means of a convenience sample, primarily containing young Belgian female students with virtual project team experience. This unevenly distributed representation of gender in the sample as well as the educational background of the respondents may restrict the transferability of outcomes to virtual project teams in private or business organizations. Nevertheless, this explorative study gives IT-project team leaders as well as designers grip on the information elements to consider as being important for an initial assessment of trustworthiness, irrespective of specific information. The identified information elements can be used as a guideline for the design of profile templates in groupware systems as well to structure ice-breaking activities. The communality between large numbers of respondents prevents the dominance of few implicit personality theories to assess trustworthiness. Future research is needed to test whether the perceived common importance of information elements to inform initial trustworthiness assessment found in this study is indeed transferable to other cultural settings as well as to 'real' virtual project teams.

In addition, this study shows which information elements are commonly perceived as being important to inform an initial assessment of trustworthiness in virtual project teams. It is one step in a series, to research the hypothesis that information elements which signal antecedents of trustworthiness (in a professional setting of equal standing), are preferred most by virtual team members. Central to this idea is that specific information provoked by specific profile elements lead to better estimates of trustworthiness and that it is not necessarily so that 'more' information is needed. In our next step we will research whether a relation between

the preferred information elements and a common conceptual model of professional trustworthiness can be made, based on the analysis of the open answers in the questionnaire within the 'simulated' virtual project team. It could well be that some information elements provide information for more than one conceptual category, for example someone's education could say something about one's ability as well as one's consistency and responsibility, thus providing more signals within one information element. If we succeed to link this, we cannot only tell which profile elements should be included in profile templates supporting communication in the initial phase of a virtual project teams, but also why they work. This will support parsimonious, but effective designs.

Finally, further research is needed to determine whether there is a difference between a 'sender' deciding which specific information elements he/she should fill in order to radiate trustworthiness and a 'receiver' looking for information elements to assess trustworthiness. We have now focused on the information needs at the receiver's end. Another interesting related line of research would be to explore the alternative ways of collecting and representing profile content, for example different data-mining and visualization techniques.

Chapter 6

Trustworthy in the eye of the beholder? A cognitive perspective on personal profile information in virtual project teams

Based on:

Rusman, E., Van Bruggen, J., Sloep, P. B., Valcke, M., & Koper, R. (2010). The Mind's Eye on Personal Profiles; How to Inform Initial Trustworthiness Assessments in Virtual Project Teams. In G. Kolfschoten, T. Herrmann, & S. Lukosch (Eds.), Lecture Notes in Computer Science: Vol. 6257. *Collaboration and Technology. Proceedings of the 16th International Conference CRIWG 2010* (pp. 297-304). September, 20-23, 2010, Maastricht, The Netherlands. Heidelberg, Germany: Springer.

Rusman, E., Van Bruggen, J., Sloep, P.B., Koper, R., & Valcke, M. (2011). Trustworthy in the eye of the beholder? - A cognitive perspective on personal profile information in virtual project teams. Accepted for *CSCL 2011: Connecting computer supported collaborative learning to policy and practice*. July, 4-8, 2011, The University of Hong Kong, Hong Kong, China.

Abstract

Collaboration in virtual project teams heavily relies on interpersonal trust, for which perceived trustworthiness is an important determinant. This study provides insight in the information that trustors value to assess a trustee's professional trustworthiness in the initial phase of a virtual project team. We expect trustors in virtual teams to value those particular information elements that provide them with relevant cues of trust warranting properties of a trustee. We identified a list of commonly highly valued information elements to inform trustworthiness assessments (n=226). We then analysed explanations for preferences with the help of a theory-grounded coding scheme. Results show that respondents value those particular information elements that provide them with multiple cues to assess the trustworthiness of a trustee. Information elements that provide unique cues could not be identified. Insight in these information preferences can inform the design of artefacts, such as personal profile templates, to support acquaintanceships in the initial phase of a virtual project team.

*'Put more trust in nobility of character than in an oath. (*Solon)

1. Introduction

A positive level of interpersonal trust improves collaboration and communication (Corbitt, Gardiner & Wright, 2004; Gambetta, 1988; Jarvenpaa, Knoll, & Leidner, 1998; Jarvenpaa & Leidner, 1998). In contrast, when there is a lack of trust, team members spend considerable time monitoring each other, backing-up or duplicating work, and documenting problems (Wilson, Straus, & McEvily, 2006). Although interpersonal trust is considered as both an important pre-condition as well as a result of collaboration, still little is known about how we can foster its formation.
One promising approach is to facilitate trustworthiness assessments. The perceived trustworthiness is an important factor that influences overall interpersonal trust of a trustor in a trustee, along with factors such as trust propensity, situational characteristics (e.g., perceived risk, task complexity, social control mechanisms) and trustors' mood at the time of trust formation (Castelfranchi & Falcone, 2010; Riegelsberger, 2005; Rousseau et al., 1998). The extent to which a trustor trusts a trustee to perform adequately in a given situation equals that trustee's perceived trustworthiness (Hardin, 2002). A trustor will continuously try to gauge the trustworthiness of an unknown trustee based on signs and signals that are available and may reveal properties of a trustee. Once these signals are considered to reveal a certain property of another, they become cues for that property (Donath, 2007). People make a 'best' guess based on signs and signals they perceive; this we call 'a first impression'.

In mediated environments, the transmission of these signs and signals is hampered or they are different (Donath, 2006, 2007), but the impression-formation process remains just as important for human interaction (Lea & Spears, 1995; Liu & Ginther, 2001; Walther, 1995). Contrary to the belief that personal relationships would not develop via computer mediated communication (CMC), because less useful information would be available to form an impression ('cues-filtered-out' perspective) (Hancock & Dunham, 2001), Walther (1995, 1996) found that only the process of impression formation is delayed. He found that, given enough time, enough information about a person is revealed and relationships grow as a result. In face-to-face situations, people use various routes to acquire information: via face-to-face interaction, via inferences based on social characteristics (e.g., communities the other takes part in) and via reputational information acquired via 'word of mouth' (Riegelsberger, 2005). In virtual project teams that predominantly use computer-based communication (e.g., email, chat, videoconferencing) these routes are often not available or only in different forms. Team members of virtual project

teams sporadically meet in person, they often do not have a prior history of working together and they may never meet in the future (Jarvenpaa & Leidner, 1998), so the routes of 'word of mouth' and 'face-to-face' interaction are in many cases blocked. Furthermore, messages that are computer-mediated do not convey the same type of signs and signals as they would in face-to-face settings. For example humorously meant messages are often misinterpreted, due to lack of intonation or expression. Also, there is less time and opportunity for informal communication. This type of teams are reported to have most problems with interpersonal trust formation, especially in the initial phases of a project (Zolin, Hinds, Fruchter, & Levitt, 2002; Zolin, Hinds, Fruchter, & Levitt, 2004).

In order to jump-start impression formation on trustworthiness in the first phases of a project one could offer team members information about their colleagues. This has been done for years by companies who organize special face-to-face team building activities, leaving the type of information exchanged up to spontaneous interaction. This approach has also infused online environments. Various artefacts have been used to stimulate the availability of personal information, such as story-telling, in a free form as well as guided by a more formal template, role-playing games, teambuilding exercises, and the facilitation of specific types of searches as approaches to meet the information need of trustors (Feng, Lazar & Preece, 2004; Salmon, 2003). The notion that a representation of people in online environments is beneficial for their collaboration is also supported from the perspective of research on presence (Gutwin, & Greenberg, 2002; Kreijns, 2004; Kreijns & Kirschner, 2004), although the link with interpersonal trust formation is not often made.

In the initial phases of collaboration this type of communication could also be supported by making relevant signs and signals available through pre-structured templates (Aranda et al., 2010; Remidez, Stam & Laffey, 2007; Ten Kate, 2009). These templates should then be designed so as to contain those information elements that provide personal information useful to assess the trustworthiness of the template owner. Examples of information elements are 'name', 'photo', 'hobbies', 'job title' and so on.

If one knew what information trustors value most to inform their trustworthiness assessments and how this relates to trustworthiness antecedents, one could provide a pre-structured template to facilitate the availability of this information (Rusman, van Bruggen, Cörvers, Sloep & Koper, 2009). However, it is still unclear what specific personal information trustors value most and why. We do know that personal information can facilitate the growth of interpersonal trust (Zolin, Fruchter & Hinds, 2003; Feng, Lazar & Preece, 2004), but we do not know what specific information supports trustworthiness assessments. First steps in the research on the significance of information elements have been made by Ten Kate (2009) and Berlanga et al. (2011). They explored in the context of social network sites (SNS) which

elements of profile templates were used to present one or perceive another. Still, the information elements originally displayed in these templates were likely chosen by designers at the senders end of the computer-supported communication process and not specifically grounded in the cognitive processes at the receivers' end. Furthermore, the context of a social network site may differ from a virtual project team as their objectives are different. In addition, virtual teams have more mechanisms for social (institutional) control on the reliability of personal information displayed than SNS, as team members are embedded in existing organizations.

Recently, Aranda, Vizcaíno, Palácio, & Morán (2010) identified profile information elements of co-workers that virtual team members considered useful to have available. Respondents were asked to rate the degree to which information elements were already known and/or useful. Based on the scores, information elements were classified in 6 categories, ranging from 'high usefulness-usually (un)known' to 'low usefulness-usually (un)known'. This results in the identification of information elements that are considered useful to be displayed in a profile of virtual team members and not yet known. However, in this study the rationale behind these preferences still remains unclear: why are especially these elements considered useful?

The selection of information elements for pre-structured templates is still a 'best guess' rather than a decision grounded in trustors' preferences and cognition. The focus of the present study is on information elements relevant to inform trustors professional trustworthiness assessments in virtual teams. When trustors form an initial impression of trustees' trustworthiness, several factors interplay (Rusman, van Bruggen, Sloep, & Koper, 2010). A trustor looks at the specific situation and the specific properties of a trustee, and is influenced by her mood as well as her trust disposition. To gauge whether a trustee has certain trust-warranting properties, a trustor collects information as cues for these properties. Although according to implicit personality theory people use different information elements as cues (Arnold, Cooper, & Robertson, 1998), we assume these elements overlap, that is, there are elements many people use. Furthermore, we hypothesize that trustors seek specific information that best matches their cognitive schema of trustworthiness antecedents. This schema guides their search for information that can function as cues for trust-warranting properties of a trustee. We test whether trustors value particular information elements that provide cues to determine whether someone is trustworthy. Some information elements may be valued more because they provide information for more than one antecedent. For example, one's education could address ability as well as consistency and responsibility. Also, from an economy principle, people may prefer single information elements that provide cues for multiple antecedents. Certain information elements will then have an increased 'weight' in a trustworthiness decision. However, people might also value information elements which provide 'unique' information related to a specific antecedent.

Therefore, we try to answer the following research question:

> *Do trustors value most those information elements that provide them with (relevant/multiple/unique) cues for specific trust-warranting properties?*

The answer to this question provides insight in the rationale behind information preferences, which can guide the design of profile templates as well as ice-breaking activities in both face-to-face as well as virtual teams.

2. Method

A questionnaire was used to collect data on common information element preferences to inform trustworthiness assessments as well as the rationale behind these preferences. We first identified the 15 most commonly selected information elements. Based on this ranked list, we analyzed the explanations respondents gave for their preferences with the help of a coding scheme grounded in a cognitive model of professional trustworthiness.

2.1. Participants

Data were collected among bachelor level students, enrolled in a research course in the Educational Sciences programme at the Ghent University. 226 students (mean age = 18,2 years, SD= 1,85; 93% of whom were female and 7% male.) filled out the questionnaire: 99 % of the respondents had previous experience with collaboration in a face-to-face project team, either in a (part-time) job or during their study. 95 % had previous experience with collaboration in a virtual project team. 88% of the respondents had experience with online conversations with people they had never met before. The majority of online conversations took place via text-based media only, either via chat and/or e-mail (78%) or in combination with short text messages (texting) (9%).

2.2. Instrument

The questionnaire consisted of two parts and contained open as well as closed questions in the respondents' native tongue (Dutch). The first part questioned respondents on the information elements they valued most to inform their trustworthiness assessments. It consisted of a brainstorm followed by a rating of elements (useful to inform their assessment/practical for collaboration) from a pre-defined list. The second part aimed to provide insight in the rationale behind these preferences. In this paper we restrict ourselves to the analysis of the second part. Here,

participants selected the 10 most important information elements to inform their trustworthiness assessments from all elements obtained in the first part of the questionnaire. They were instructed to justify their choices by explaining what 'facts' they thought they could derive from an information element and why this was important to inform their trustworthiness assessments.

2.3. Procedure

The participants filled out the questionnaire after a short presentation that clarified our definition of virtual project teams and that showed some examples. The presentation also discussed the role of interpersonal trust for collaboration and the objectives of the questionnaire. At the start of the questionnaire, respondents were prompted by a scenario in which they acted as a member of a new European project, which required them to collaborate in a virtual project team. They were told that they had to form a first impression of their team members' trustworthiness by selecting the information element that in their opinion mattered most for their trustworthiness assessments. Respondents were told that the responses to this questionnaire would be kept anonymous and that it would take about 30 minutes to complete this part of the questionnaire. Table 6.1 provides an example (translated) of the collected responses.

Table 6.1. Example response

Preferred information element	Facts which can be derived from this information element	Explanation of preference
Personal motivation for project	Reason for participation; expectation(s) of project	You get to know whether you are on the same wavelength. Do you have the same expectations?

2.4. Data analysis

We first identified the 15 information elements that were most commonly mentioned as highly informative for trustworthiness assessments. Secondly, all explanations linked with this top 15 were gathered and coded with the help of a coding scheme. The coding scheme was derived from a theoretical framework for interpersonal trust building in virtual teams, called TrustWorthiness ANtecedent schema (TWAN) (Rusman et al., 2010). Some categories were added to allow for explanations which were not directly related to trust building, or that were examples of antecedents of interpersonal trust or trustworthiness not yet mentioned in any of the predefined categories (see Appendix K). We coded 1) whether trustors' explanations of their information preferences match with the trust warranting properties of

a trustee; 2) whether and how they adhere to the trust formation process in general or 3) whether they are not related to interpersonal trust at all. Here we report the results of the first part of the coding scheme, the complete scheme is available in Appendix K.

Each explanation was considered as a coding unit (Miles, & Huberman, 1994), multiple different codes were allowed. Two raters individually coded 10 % of the explanations with the help of the coding scheme (Neuendorf, 2002). The interrater-reliability (Cohen's Kappa) was 0.79 for the coding with the TWAN schema only and 0.73 for the coding with the complete coding scheme. According to Fleiss (1981), this can be considered a good (0.6-0.75) to excellent (> 0.75) interrater-reliability. The remaining responses were analyzed by one rater only.

Not all respondents provided explanations of their information preferences. We counted the possible-to-code explanations per information element and expressed the frequencies of 'code-use' in percentages relative to this number of explanations.

3. Results

We received 2251 open entries from 226 respondents, of which 1882 entries were genuine rankings and 369 (16%) entries could not be used as respondents did not correctly follow the instruction, and selected and described fewer than 10 information elements. In total, 106 different information elements were selected by respondents. 9 of them were not in the pre-defined list which respondents had available, but resulted from the brainstorm. Examples are 'stress immunity', 'computer skills' and 'meeting skills'. Table 6.2 shows an overview of the 15 most selected information elements and the number of explanations acquired for these preferences.

Table 6.2. The 15 most selected information elements and acquired explanations

Information element	**Frequency (times selected by respondents)**	**Codable explanations**
Personality traits/character	124	112
Work experience	118	108
Personal motivation for project	117	106
Education/studies/training/diplomas	94	84
Age/date of birth	87	78
Availability during project/agenda	82	76
Recommendations/references/reviews by third parties	74	62
Project work experience	67	59
Language/language proficiency/language skills	66	62
Photo (formal/informal)	65	64
Interests/hobbies	60	56
Family situation/marital status	54	50
Ideas in relation to project	49	39
Occupation/function/role/job	49	46
Nationality	47	43
TOTAL	1153	1045

Competence (40%), Commitment (26%), Responsibility (17%), Availability (12%) and Communality (7%) were the most frequently mentioned antecedents of professional trustworthiness across all explanations given with the 15 most selected information elements (percentages are expressed relative to the total number of used codes). Table 6.3 gives some literal example quotes of the top 3 antecedents mentioned with regard to different information elements. The first and second example also illustrate how a single explanation can be coded with more coding categories, since they contain elements of competence as well as of the route through which information was obtained.

Table 6.3. Example quotes

Antecedent	Example quotes with adjoining information element
Competence	"I will perceive someone with more work experience as more reliable as this person will probably do his job well when he could work for several years within a company and he will also, through experience, know more" (work experience)
	"An older person has more work experience and if he/she is selected to participate in the project he/she has proven to be reliable" (age/date of birth)
	"How well one can manage languages, positive or negative. It is important to master some languages to advance communication, especially in an international project" (language proficiency)
Commitment	"Number of professions someone had. Rising functions relative to their age. If someone works his way up, he will also spend more time and energy in the project, therefore you can count on this person" (work experience)
	"Why someone participates in a project. If someone participates involuntary, he/she will probably be less motivated than someone who participates voluntarily" (personal motivation)
Responsibility	"You will know whether someone will dedicate him/herself [to the project] and of what one is capable of. Someone who makes sincere choices is more reliable in accomplishing the task. Someone with ambition already proved that he/she is suitable." (personal motivation)
	"Someone older has usually more life and work experience. Therefore he/she can also take more responsibility and is autonomous" (age)

Respondents also mentioned various other antecedents (11%), which were not part of the trustworthiness antecedent schema, such as stubborn, enterprising, creative, flexible, respectful, independent/autonomous, enthusiastic and cheerful.

Table 6.4 provides an overview of the code frequencies expressed in terms of percentages calculated relative to the number of explanations obtained for each information element. Different codes per explanation were possible, which explains why sums of percentages exceed 100. The percentage indicates how often respondents mentioned one of the antecedents in the explanations for their information element preferences. For example, if we look at the first column and row of the table, respondents refer to the antecedent 'availability' as a rationale for their preference of the information element 'personality traits/character' in 4% of the explanations provided with this information element. As the current interest is in the relation between the preference of information elements and the rationale behind this preference, antecedents mentioned in more than 10% of the provided explanations are highlighted.

For most information elements, respondents used explanations in which they referred to the concepts of the trustworthiness antecedent schema. Looking at the number of antecedents mentioned more frequently (>10% = shaded table cells) as a rationale for information preferences, for all information elements at least two antecedents per information element are mentioned more frequently compared to others, although they refer to different antecedents. For example, for the information element 'personality traits', respondents mention 7 antecedents in more then

10% of their explanations as a rationale, namely caring, commitment, competence, consistency, openness, persistence and receptivity (next to a relatively large number of various additional antecedents). This indicates that respondents generally expect the information element 'Personality traits/character' to contain useful information to assess professional trustworthiness on several antecedents. Two of these antecedents, namely 'caring' and 'receptivity' were not mentioned frequently in other explanations of information element preferences, indicating this information element can also function as a 'rare', although not unique (in the sense of a 1-to-1 relation), cue for a property. Only for the information element 'photo' (nr. 10) no clear relationship with any trustworthiness antecedent was obtained. Several antecedents were not at all mentioned as a rationale in the explanations of the 15 most commonly preferred information elements, respectively discreteness, fairness and loyalty.

Table 6.4. Code frequencies expressed as percentages of the number of obtained explanations

Codes / Information elements	Availability	Caring	Communality	Commitment	Competence	Consistency	Discretion	Fairness	Faith in intentions	Friendliness	Willingness to help	Honesty	Integrity	Knowledge	Loyalty	Openness	Other Antecedent	Persistence	Receptivity	Reliability	Responsibility	Sharing	Skills
1. Personality traits/ character	4	11	8	27	15	10	0	0	2	7	1	6	5	0	0	13	69	10	10	4	5	0	1
2. Work experience	1	2	0	14	91	11	0	0	0	0	8	2	1	9	0	0	10	4	1	2	27	0	9
3. Personal motivation for project	12	1	6	92	8	1	0	0	2	0	0	0	7	0	0	0	4	13	0	5	34	0	0
4. Education/ studies/ training/ diplomas	1	0	1	27	88	0	0	0	0	0	0	0	1	23	0	0	0	6	0	0	35	0	4
5. Age/date of birth	0	0	22	3	73	5	0	0	0	0	0	1	0	5	0	1	3	0	0	6	2	0	0
6. Availability during project/ agenda	89	0	1	30	4	4	0	0	0	0	0	1	0	1	0	0	0	1	0	7	22	0	0
7. Recommendations/ references/ reviews by third parties	0	0	0	15	32	0	0	0	0	0	0	6	0	0	0	0	0	0	0	3	27	0	0
8. Project work experience	0	0	0	14	51	0	0	0	0	0	5	0	0	0	0	0	0	2	0	2	7	0	7
9. Language/ language proficiency/ language skills	2	0	8	11	81	0	0	0	0	0	3	0	0	5	0	0	5	0	0	0	8	0	45
10. Photo (formal/ informal)	0	0	2	2	2	0	0	0	0	2	0	0	0	0	0	5	5	0	0	0	0	0	0
11. Interests/ hobbies	13	9	21	34	11	0	0	0	0	0	0	0	0	2	0	2	7	0	0	0	21	2	0
12. Family situation/ marital status	36	2	4	10	12	0	0	0	0	0	0	0	6	0	0	4	8	0	0	0	10	0	0
13. Ideas in relation to project	0	0	21	54	33	0	0	0	0	0	3	0	0	3	0	3	15	0	3	0	10	3	8
14. Occupation/ function/role/ job	7	0	2	17	76	2	0	0	0	0	0	0	0	13	0	2	13	7	0	0	20	0	9
15. Nationality	19	2	28	0	2	0	0	0	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0

4. Conclusion and discussion

Results indicate that trustors value information elements that may reveal information that corresponds to multiple properties of a trustworthy person (as represented in the trustworthiness antecedent schema) most. Although each trustor in principle uses various and often different information elements to assess the professional trustworthiness of colleagues, there is quite some overlap in information element preferences as well as their underlying rationale.

Participants seem to select information elements that provide multiple cues for multiple antecedents. We could not find proof for the hypothesis of the uniqueness of information elements as cues; indeed, most information elements functioned as cue to more than one trustworthiness antecedent. This could be an indication of an 'information efficiency' strategy of trustors, resulting in their preference of elements that provide cues for more than one trustworthiness antecedents. Conversely, some patterns between information elements and antecedents could also be identified. For example, there seem to be strong relations between each of the information elements 'work experience', 'education', 'age', 'language skills', 'occupation/function/role/job' and the antecedent 'competence' in comparison to the other information elements and antecedents. Likewise, stronger relations can be seen between the elements 'personal motivation', 'ideas in relation with a project' and the antecedent 'commitment'. Results also reveal that not all information preferences can be explained with the cognitive schema of trustworthiness: some information elements, such as a photo, seem to be selected because they provide trustors with a certain 'feel' for a trustee. These explanations were principally coded as PERI, a code which refers to an intuitive and affective impression that contributes to the trust formation process.

Another interesting result is that often-used information elements, such as 'name', hardly seem to matter for professional trustworthiness assessments. Information elements most likely fulfill different functions and this element may merely function as an identity or reference tag, to distinguish between and to address people ('the flag on the ship'). Apparently, it does not carry weight in a trustworthiness assessment, although it can fulfill other functions. Rusman, van Bruggen, Sloep, Valcke, & Koper (2011) earlier identified information elements that were both identified as practical as well as relevant for professional trustworthiness assessments, such as 'availability during project' and 'language and language proficiency'. Another possibility is that people unconsciously consider some information as something that is 'known', as in Aranda's et al. (2010) classification, and therefore are disregarded as being influential for their judgment.

When looking at the overall TWAN schema, especially the antecedents of competence, commitment, responsibility, availability and communality were most often referred to as rationales in the provided explanations. However, in contrast with the

expectance, respondents did not refer to all antecedents of the TWAN model: Discreteness, fairness and loyalty and sharing were not mentioned at all in the explanations provided with the top 15 most preferred information elements. This could be a result of the focus on the initial phase of trust formation, in which some antecedents can be assessed more easily then others. It might also indicate that some antecedents are emphasized more than others, depending on the collaborative stage, when assessing professional trustworthiness.

In summary, practical implications of this study are twofold. First, insight in the rational behind information preferences can guide the design of artefacts to become acquainted and to inform trustworthiness assessments in virtual teams, such as profiles. Second, the coding scheme could also function as an analysis framework for interpersonal trust related problems in teams. Further research is needed to verify whether the scheme can indeed fulfill this function. Future research should also target the further analysis of the qualitative data from the perspective of the other coding categories included in Appendix K, such as the characteristics of the trust-requiring situation, routes through which information is acquired and the different trust manifestations, to gain further insight in the professional interpersonal trust construct, from a ‘state’ as well as a ‘process’ perspective.

Chapter 7

General discussion

'*Trust each other again and again. When the trust level gets high enough, people transcend apparent limits, discovering new and awesome abilities for which they were previously unaware.*' (David Armistead)

1. Introduction

Although getting to know each other is widely recognized to foster interpersonal trust building in the initial phases of a virtual project team (Feng, Lazar & Preece, 2004; Jarvenpaa & Leidner, 1999; Kanawattanachai & Yoo, 2005; Zolin, Fruchter, & Hinds, 2003), what information exactly contributes to this process and how it does so is still mostly unknown. Consequently, the number of methods used to get acquainted is rather limited and face-to-face meetings are notoriously touted as the most suitable solution (Gibson & Manuel, 2003; Handy, 1995), without really knowing why.

Our research attempts to fill this gap in our knowledge by investigating a theoretical approach in which a link between the availability of information and a cognitive perspective on trustworthiness assessments is made. Therefore, the main research question as formulated in Chapter 1 was 'How to inform trustworthiness assessments of virtual project team members in the initial phase of collaboration?'.

To answer this question five subordinate research questions were posed, which we approached from a theoretical (top-down) as well as a practical, design-oriented (bottom-up) research approach, leading to a final evaluation. This final chapter first reviews the main results and conclusions of each study in answer to these research questions. Then, overall conclusions are drawn. Finally, a reflection on strengths and weaknesses in terms of theory as well as methodology is presented, and practical implications and possibilities for future research are sketched.

2. Review of the results

2.1. Theoretical perspective

The studies reported in Chapters 2 and 3 were designed to gain insight in the differences between the interpersonal trust formation process in virtual and face-to-face teams (*research question 1*), and to develop an approach, grounded in theory on the role and nature of trustworthiness assessments (*research question 2*), to support interpersonal trust formation in virtual project teams.

The study in Chapter 2 showed that, under the assumption that the overall interpersonal trust formation process in virtual and face-to-face teams is similar, vir-

tual teams differ from face-to-face teams with regard to the number and type of signs and signals they have available to determine whether their colleagues are trustworthy. As the interpersonal trust state relies to a large extent on the cognitive model of trustworthiness of a trustee (Tanis & Postmes, 2005; Zolin, Hinds, Fruchter & Levitt, 2002), this state is often lower and more fragile in virtual teams than it is in face-to-face teams (Greenberg, Greenberg & Antonucci, 2007). In the absence of signs and signals virtual teams fall back on inferred information (e.g., based on stereotypes or other categorical cognitive schemata) (Hung, Dennis & Robert, 2004; Postmes, Haslam, & Swaab, 2005), which can lead to erroneous and quite persistent judgments of professional trustworthiness.

Hence, one may improve the formation of interpersonal trust by stimulating the availability of information which should help to assess whether someone can be considered trustworthy. It is reasoned that specific signals, which provide cues for the antecedents of a cognitive schema of trustworthiness (Bacharach & Gambetta, 1997; Donath, 2006), could accelerate the formation of a cognitive model of trustworthiness and improve its full instantiation. The proposition is that project team members instantiate this cognitive schema when assessing the trustworthiness of a particular trustee in a non-hierarchical, professional, trust-requiring situation. In Chapter 2, the TrustWorthiness ANtecedent (TWAN) schema was proposed as such a cognitive schema for professional trustworthiness. It was derived from a literature review that focussed on the antecedents of trustworthiness assessments, in which both private as well as professional settings were taken into account. The purpose was to cover existing research on trustworthiness antecedents, as well as to extend it, by integrating all antecedents which could be relevant for a trustworthiness assessment. This was done as a first step, to provide the basis for the second step - to be taken in Chapter 3 - in which empirical research is used to determine which antecedents are actually taken into account by professionals who assess trustworthiness in practice.

To this end, the study described in Chapter 3 firstly aimed to develop a valid and reliable instrument to measure trustworthiness derived from the proposed TWAN schema, wherever possible based on previously used measurement items. Secondly, the study examined on which antecedents professional trustworthiness assessments are based in practice. This was done by canvassing a large number of professionals with extensive collaboration experience for their trustworthiness assessments of two colleagues of equal standing (non-hierarchical relationship). They were asked to identify one colleague they trusted most and one they trusted least within a particular project. Our choice of this research setting was based on the assumption that people with a long-term collaborative relationship would develop a detailed and broad conceptual model of their colleagues' trustworthiness. Furthermore, asking about their concepts of trustworthiness within a project set a boundary to extreme answers, while at the same time ensuring that the variation of pro-

ject settings guaranteed a wide variety of 'assessed cases' across the population. Thus trustors were prevented to assess the most or least trustworthy person they ever encountered in their lifes.

Although it was hypothesised that trustworthiness assessments would potentially be based on all antecedents in the TWAN schema and could be categorised along five dimensions, the actual results showed a different picture. Antecedents did not cluster according to the hypothesised five dimensions, one antecedent (self-confidence) did not load on the factor of perceived professional trustworthiness and one antecedent (consistency) could not be operationalised well enough. This led us to adapt the TWAN schema and an accompanying operationalised and partially validated measure of professional trustworthiness, which consisted of 21 scales: communality; knowledge; skills; competence; willingness to help; availability; sharing; faith in intentions; caring; commitment; receptivity; friendliness; openness; integrity; discretion; honesty; fairness; loyalty; reliability; persistence and responsibility.

Subsequently, to determine the most parsimonious and meaningful measure for professional trustworthiness, the concurrent validity of the TWAN schema plus Trust Predisposition (one's general 'trusting' attitude towards others, independent of a specific trustee or situation) (Rotter, 1967; Yamagashi, Cook & Watabe, 1998; Zolin, Hinds, Fruchter & Levitt, 2002), with a widely accepted interpersonal trust measure (Beranek, 2000; Jarvenpaa & Leidner, 1999, 2000; Dirks & Ferrin, 2002; Gill, Boise, Finegan & McNally, 2005; Robert, Dennis & Hung, 2009) developed by Mayer & Davis (1999) was determined. This led to seven remaining antecedents of which the professional trustworthiness antecedents 'communality', 'sharing' and 'responsibility' were the strongest predictors, followed by 'skills', 'persistence', 'caring' and 'discretion'. Trust predisposition turned out to be less predictive than expected on the basis of results reported in previous research.

In sum, the theoretical stance to our research question resulted in the propositions that professionals search for signs and signals that can be used to instantiate their cognitive schema of trustworthiness and that one approach to support virtual project teams is to stimulate the availability of information that can function as cues to their cognitive schema. Results indicated 21 antecedents of trustworthiness which are used by professionals to assess colleagues of equal standing, of which seven were the most predictive for their overall trustworthiness assessment after extensive collaboration. Knowing what antecedents contribute to a professional trustworthiness assessment, we could then investigate whether a profile is a suitable aid to inform these assessments in practice.

2.2. Design-oriented perspective

The studies described in Chapters 4 and 5 were meant to explore if and how virtual project team members valued having a profile with static and/or dynamic information elements (Danis, 2000) available to them to inform their initial trustworthiness assessments (*research question 3*); the ultimate aim was to determine which information elements could, derived from common preferences, best become part of such a profile (*research question 4*).

Results of the study in Chapter 4 showed that virtual project team members found a profile template with static information elements especially useful to get acquainted during the first two to three weeks. When it became available only after this period, it was not considered useful anymore. After this initial three-week period, team members report to base their impression on indicators such as the quality of work-related contributions, behaviour during collaboration (e.g., responsiveness) and communication style. If no profile had been available in the initial phase, they grounded their impression in whatever information was available. This finding provides further evidence for the notion that people construct an impression of each other's trustworthiness, irrespective of the available amount and quality of the information (Lea & Spears, 1995; Liu & Ginther, 2001; Postmes, Haslam, & Swaab, 2005; Walther, 2005). However, when available on time, all used the profile template, filled it in as well read the descriptions of their team members. When it was not available, team members indicated that they would like to have had it available in the initial phase of a project.

The virtual team members expressed different opinions on the topic of the representation of dynamic information. Results suggested that users do not necessarily need dynamic information explicitly displayed in order to form an impression, as they derive this information from the context and communicative behaviour of their team members (for example from the responsiveness on messages or the immediate acceptance of tasks).

To identify information elements which could be informative for initial trustworthiness assessments (Riegelsberger, 2005), the study in Chapter 5 inventoried information elements perceived as important by designers as well as trustors with virtual project team experience. Based on the information elements which were made available by system designers across seventeen different trust-requiring contexts a list of 154 very diverse information elements was construed. Only fifteen information elements were present across all contexts. These findings suggest that designers hold different implicit views on the information elements that are needed within a trust-requiring (professional) context. The designers also seem to insist that those different contexts require information tailored to their functional objectives (e.g., to find a suitable partner or job).

The complete list of 154 information elements was used to determine their perceived importance to inform initial trustworthiness assessments as well as their

practical relevance for collaboration among students with virtual project team experience. Looking at the list of results with twenty-three information elements, the highest rated information elements across respondents (e.g., expertise, personal motivation for a project, project time capacity) seem to signal characteristics especially aimed to reveal trustworthy properties in a professional context, such as a trustee's ability, motivation and availability. Although we expected that more personal, not work-related information would also be important for initial impression information in professional settings (Jarvenpaa & Leidner, 1999; Zolin et al., 2003), the results of this study did not confirm this expectation. Furthermore, respondents seem to assume that basic information on the identity of the other, such as a name, photo etc., is available. They do not commonly indicate these information elements as important for the determination of trustworthiness, although they were made available by system designers throughout all trust-requiring situations. Interestingly, the list with information elements commonly preferred to inform initial trustworthiness assessments is significantly different from the list of information elements that system designers provided across various high-trust-requiring environments. The list preferred by repondents also showed that only few dynamic information elements were seen as important for the formation of a first impression of trustworthiness.

The practical information elements identified were almost all related to an insight in the availability of the other, and in the language and methods with which people can contact each other. Some of these information elements overlap with the information elements identified as important for trustworthiness assessments. However, elements not perceived as relevant for trustworthiness assessments can be considered relevant for practical purposes, such as the 'local time at the location of a team member'. These results suggest that information elements can have multiple as well as unique functions to inform users.

Taken together, the design-oriented stance to our research question indicates that a profile template can stimulate users to make static information available which can inform trustworthiness assessments in the early stage of collaboration. As such, we consider it as a useful approach to inform trustworthiness assessments, but only in this early stage; later on more behavioural signs and signals are used. It also seems that users are less interested in dynamic information representation in profiles. A subset of information elements, which are commonly considered important to facilitate initial trustworthiness assessments among designers as well as users, was identified.

2.3. Evaluation

The purpose of the study in Chapter 6 was to explore whether certain information elements are more informative for trustors to judge professional trustworthiness than others. We hypothesised that trustors value particular information elements since they provide them with relevant cues for trust warranting properties of a trustee (Bacharach & Gambetta, 1997; Donath, 2006; Riegelsberger, 2005) (*research question 5*). To test this proposition, trustors with virtual project team experience selected the information elements they felt were most informative for their trustworthiness assessments at the initial stage of collaboration and described factual information they could derive from them as well as their interpretations. The theoretical framework of interpersonal trust formation and the TWAN schema were translated into a coding scheme according to which explanations could be analysed (Miles, & Huberman, 1994; Neuendorf, 2002). Results showed that respondents indeed put most value on information elements that provided them with multiple cues to the trustworthiness of a trustee. Information elements providing unique cues could not be identified. This could be an indication of an 'information efficiency' strategy of trustors, who would prefer elements that provide cues for several trustworthiness antecedents to those that provide cues to one only.

The antecedents of professional trustworthiness that were most frequently mentioned across all explanations were 1) competence (40%), 2) commitment (26%), 3) responsibility (17%), 4) availability (12%) and 5) communality (7%). Respondents failed to refer to all antecedents of the TWAN model: in the explanations provided with the top fifteen information elements most valued to inform initial trustworthiness, 'discreteness', 'fairness' and 'loyalty' were not mentioned at all.

Information elements which were identified as most important for trust formation overlapped with those previously found, but this study identified several others. The information elements 'age/date of birth', 'recommendations/references/reviews by third parties', 'photo', 'interest/hobbies', 'family situation/marital status', occupation/function/role/job' and 'nationality' were also seen as important for trustworthiness assessments. Another remarkable, recurrent result is that often-used information elements, such as 'name', hardly seem to matter to professional trustworthiness assessments. This does not necessarily reflect their lack of importance but rather people's assumption that they will simply always be at hand. Indeed, we found that across seventeen environments, these elements were always available. Another possibility is that they merely function as identity proxies, which are not expected to reveal personal characteristics. Results also indicate that not all information preferences can be explained with the cognitive schema of trustworthiness alone: some information elements which were highly appreciated, such as a photo, seem to be selected because they provide trustors with a certain 'feeling' about a trustee.

3. Overall conclusion

In this thesis, we attempted to gain insight in how best to inform professional trustworthiness assessments of virtual project team members; we restricted our scope to the initial phase of collaboration. Looking back at the results, we may conclude that providing trustors with information that matches their specific cognitive needs during the first three weeks of collaboration is a promising approach. Although it was expected that trustors would focus on finding 'evidence' for all of the 21 professional trustworthiness antecedents identified during the various stages of collaboration, we found that, in contrast, antecedents receive different emphasis, depending on the collaborative stage. The antecedents 'communality' (have something in common) and 'responsibility' were stressed both at the initial and later collaborative phases. The antecedents 'skills', 'sharing', 'persistence', 'caring' and 'discretion' influenced trustworthiness attributions only after extensive collaboration, whereas 'competence', 'commitment' and 'availability' were used specifically in the initial phase. Certain information elements are more informative, as they provide multiple cues for the trustworthiness antecedents.

4. Discussion

4.1. Theory and scope

This thesis might give the impression that providing profile templates results in the formation of high, initial interpersonal trust states (through facilitated trustworthiness assessments). This is not the case, though, as the actual trust states achieved always depend on the characteristics of people, tasks and context. However, this thesis does provide clues to accelerate and support the assessment process, thus possibly enabling virtual project team members to form broader, more balanced and better informed impressions of trustworthiness. To test this hypothesised effect, it would be worthwhile to compare impressions formed in similar virtual project teams without and with (different versions of) a profile template, and use the TWAN scale to gain insight in the impressions formed.

After partial validation of the TrustWorthinessANtecedent (TWAN) schema, we started with the assumption that all 21 antecedents of professional trustworthiness would be sought after and steer information collection. However, although all antecedents indeed are taken into account when assessing trustworthiness, we discovered that cognitive information needs varied through the collaborative stages. Although this is an interesting finding in itself, it is silent about why certain antecedents receive more emphasis than others, dependent on the collaboration stage. Allowing some room for speculation, it could be that the judgement of, for example,

the antecedent of 'discretion', is practically more problematic in the initial phases of collaboration. After all, it seems to be more difficult to assess and to require more complex, experience-fed information, which even might not yet be available. Our findings point in that direction, as after the initial stage, virtual project team members use more behavioural, communicational and task-related information (e.g., quality of input, responsiveness to questions, participation in discussions). This is in line with previous research which found that higher trust states were established and kept within (virtual) teams that were continuously and frequently interacting during a project (Iacono & Weisband, 1997; Jarvenpaa & Leidner, 1998).

It might also be that the complexity and nature of collaborative stages vary and that different stages, as a function of that, require different trustworthiness 'constellations'. This notion of trustworthiness 'constellations' could also provide an explanation for the different interpersonal trust states ('thin' versus 'thick') and the partial transferability of interpersonal trust states across contexts. Starting off with an interpersonal trust state mainly based on the trustors' trust predisposition, mood and the characteristics of the context (also called 'swift trust'), a trustor initially specifically tries to assess the competence, commitment, availability, communality and responsibility of a trustee. These antecedents form the basis, next to predisposition, mood and context, for the initial interpersonal trust state of a trustor, which 'grows' but is still 'thin' and is mainly based on initial available signs and signals. Once having formed an image of these trustworthy properties of a trustee, a trustor extends this image by reinforcing (e.g., communality and responsibility) and extending certain trustworthy properties (e.g., 'skills', 'sharing', 'persistence', 'caring' and 'discretion'), mainly based on signs and signals picked up during interaction. Once this image of trustworthiness of a trustee has been built on many antecedents each adding a certain weight to the overall assessment of trustworthiness, this assessment will slowly become more influential for the overall interpersonal trust state. Contextual factors and trust predisposition add an increasingly smaller weight to the overall trust state. This might also provide an explanation for the mixing of the terms 'interpersonal trust' and 'trustworthiness' in literature: once a trustor knows more about the trustworthiness of a trustee, the overall interpersonal trust state will largely be effected by this assessment (the other factors gain relatively less weight). If the trustworthiness of a trustee is still based on competence, commitment, availability, communality and responsibility, the impression is still 'thin' and relatively untransferable to new contexts. If it is based on more antecedents, in which skills', 'sharing', 'persistence', 'caring' and 'discretion' receive more emphasis, the overall impression of trustworthiness is 'thicker' and this trustworthy person will be more likely to be trusted in other situations as well.

Yet another possibility is that some antecedents are conditional for others, that there is a kind of relational structure between antecedents. All of this is as yet unchartered territory, offering opportunities for further research.

Another notable finding that might be explained from this 'time or stage-dependent variation of cognitive needs'-perspective is that trust predisposition did not relate as strongly to the overall trustworthiness assessments after extensive collaboration as could be expected from previous findings. It is possible that the degree of familiarity (determined by a shared history and frequent encounters) is important for whether trust propensity plays a determinant role in trustworthiness assessments. This would imply that it is especially influential during trustworthiness assessment in the initial phases of collaboration.

Interestingly, although the TWAN schema was derived from theoretical contributions from various domains and tried to cover all antecedents mentioned in previous research, respondents indicated several additional antecedents that in their view should be part of trustworthiness assessments. Some of their suggestions overlapped - for example being flexible, respectful or autonomous - indicating that they mattered to several respondents. These findings can provide a lead to further extend and validate the schema, possibly together with developing a valid and reliable measure for the as yet unverified antecedent of 'consistency'.

Another remarkable result is the difference in selected information elements in the studies in Chapters 5 and 6. In the first study we identified common information preferences by calculating their mean rated value, thereby ensuring an as broad as possible coverage of preferences in the group. In the latter study, we aimed to study personal preferences in more depth and therefore asked trustors to select the most important elements from a brainstorm they did previously as well as the information elements they ranked highly. We also asked trustors to provide explanations for their preferences. Although some information elements found in this study overlapped with those found in the first study, three elements did not; they were 'project work experience', 'family situation/marital status' and 'nationality'. This finding can imply several things: the findings in Chapter 6 indicate the information elements that are, upon reflection, the most important, but within the group this preference is less generally shared. If these elements would be used to inform design, they would be very effective, but for a smaller number of people. The findings in Chapter 5 on the contrary would support a broader group of people, but would be less effective in supporting the trustworthiness assessments. Another possible explanation for this difference is that although trustors rated some information elements initially lower (e.g., 4 instead of 5), upon reflection found them more important than at the outset.

In this thesis we have focussed on the receiver's perspective on and interpretation of information to inform professional trustworthiness assessments. However, it would also be interesting to look at our findings from the sender's end: how does a trustee try to signal trustworthy properties by revealing specific information? This perspective pertains to issues in identity and impression management, which offers another interesting avenue for future research, applicable in a setting such as job applications.

4.2. Methodology

Although the studies carried out were designed and arranged to provide valid and reliable results, they were bounded by practical considerations and therefore some limitations should be acknowledged.

Firstly, for the large scale field study meant to evaluate the TWAN schema and reported in Chapter 3, we asked project members to assess the trustworthiness of colleagues within one and the same project, to keep contextual factors similar and standardise their effects as well as to prevent the assessments of extremes (the most versus the least trustworthy person you have ever met). We assumed a normal distribution of the trustworthiness assessments acquired by this method and this was supported by the data. However, people might have chosen to collaborate in a team of a particular composition rather than in a differently composed one, precisely because of the trustworthiness of their members. It therefore cannot be excluded that our sample consisted of people who are considered already more trustworthy than random colleagues. If true, this would have resulted in a restriction of range in the data. In particular, it would have led to a shift of emphasis, from antecedents that matter for initial trustworthiness towards antecedents that play a part in later phases of collaboration. A counter argument for this notion is that employees in many cases are not free to choose their project partners and are often requested to participate within a certain project group by their managers, which thus would ensure a broader variation of projects and associated trustworthiness states. Within the practical boundaries of this research context, in our opinion this was the only feasible way to collect data from a large number of project team members within diverse project team settings, in order to partially validate the TWAN scale.

Secondly, the studies reported in Chapter 5 and Chapter 6 were carried out with a respondent group of primarily Belgian female students. Although we have not found any literature on the relation between professional trustworthiness assessments and gender, let alone professional trustworthiness assessments and Belgians, strictly one cannot rule out such an effect.

Another difference between these two studies is that the first study asked professionals to report on 'real' colleagues, whereas the latter asked what they thought would be important information and why they considered this information important in the event they had to assess a (hypothetical) colleague in a virtual project team. However, in both situations trustors use information as cues for their cognitive schema of trustworthiness, thus operating with the same reference framework, thereby making the results comparable.

Additionally, the approach with a hypothetical trustee also assumes that trustors consciously know what signals they take into account and how they use them to assess others; one could well argue that this process is less conscious than we assume it to be. However, from previous studies we know that trustors especially use this more rational approach during initial encounters, especially in mediated settings, and therefore we considered this research set-up suitable.

Thirdly, in our emperical studies we mainly worked with self-reported responses (structured and open questionnaires, interview), which carry the risk of receiving socially desirable answers. Previous work has looked into trusting behaviour (e.g., checking the performance of a trustee) as a measure for an interpersonal trust state. But as we have argued in Chapter 2, this does only provide insight in whether a trust state exceeds a certain threshold level and does not distinguish between the different factors that influence this state, such as contextual and personal circumstances (e.g., mood, trust predisposition). Here, we were especially interested in the cognitive schema underlying it and therefore wanted to collect data that could best provide such insights. This was another reason why we gathered the data both in a real-life context as well as in a more abstract setting. The data in the real-life context varied enough to take the edge off the argument of a large, social desirability effect. By asking trustors on a more abstract level, without relating to a specific trustee, we tried to both gain insight in their cognitive process as well rule out the influence of the characteristics of a specific person and a possibly related, socially desirable answer.

Fourthly, our findings with regard to the TWAN schema as well as to the information elements best represented in a profile template should be transferable to other knowledge-intense professional situations in western cultures, as found in Europe, Australasia and the US. However, one should be cautious with applying it in different types of work-contexts in terms of culture as well as complexity. For example, the antecedents of trustworthiness of a construction worker could be different, as this is a less knowledge intensive form of collaboration. It is also possible that the antecedents are (partly) socially and/or culturally determined and as such not, partly or only differently applicable in professional settings in non-western countries (e.g., Asian or Latin American countries).

Additionally, our results are not automatically transferable to larger units (e.g., groups, organizations); different units, such as objects (e.g., websites); nor to different types of relations (e.g., hierarchical relations). However, these restrictions apply to the majority of interpersonal trust related research.

4.3. Practical implications

This thesis started off with the wish to understand if and why some information has more significance than other information when initially assessing professional trustworthiness. The insights gained in the cognitive foundation of information preferences allow virtual project team leaders as well as designers of virtual project environments to come to grips with the information elements that matter to an initial assessment of professional trustworthiness. Information elements can be used as a guideline for the design of profile templates in groupware systems as well to structure ice-breaking activities, which support professional trustworthiness assessments. The information elements identified in Chapter 5 may be used to support quite broad assessments, whereas the elements identified in Chapter 6 may inform parsimonious, effective designs; admittedly, not all information elements identified are equally important to everyone. As this thesis focussed on the content of information, results should inform initial encounters in all mediated settings (e.g., phone, mail, videoconferencing), until proven differently. Previous research in virtual project teams focussed principally on the medium by which information was spread and failed to take the specific content of the information into account.

The studies in this thesis also yielded several research instruments which can be used by the scientific community to further study the relation between perceived professional trustworthiness and overall interpersonal trust in teams. Especially the partially validated measure for professional trustworthiness (the TWAN scale), the coding scheme representing codes covering the overall interpersonal trust formation process and the profile template would be useful to support future research in this domain.

These findings might also be useful for virtual project teams in multinational organizations; however this thesis was based on experiences of professionals as well as students with work and collaborative experience in (virtual) teams. In order to implement it in multinational organizations future research might be carried out in this type of environments to further integrate and validate our findings in working practice. One problematic issue which needs to be overcome here is that the context, tasks and composition of these teams need to be similar, to enable generalisations about the relation between trustworthiness assessments and overall interpersonal trust.

5. Further research

Although several opportunities for further research were already mentioned in the discussion, here some final, more divergent, ideas for future research are outlined.

First, the focus in this thesis was on information elements which could help to inform initial professional trustworthiness assessments by matching to trustor's cognitive information needs as represented in the TrustWorthinessANtecedent (TWAN) schema. Further research is needed into the question of whether the TWAN schema can also be used as a classification to make a link between trust-(de)generating behaviour and impressions formed during later phases of team collaboration (Six, Nooteboom & Hoogendoorn, 2010). Possibly, the TWAN schema might prove useful as a diagnostic instrument in cases of problematic collaboration. The model and measurement instrument could then help to analyse and chart the state and nature of professional trustworthiness assessments, thereby providing clues to overcome cases of problematic team collaboration that are the result of impaired interpersonal trust.

Second, we identified information elements which are preferred because of their significance for professional trustworthiness assessments. We remained silent, however, on how they should best be conveyed. We explored one approach, which was practically implementable and perceived as a suitable method by trustors, namely a profile template. However, the consequences of making this information available by different methods or different media and their effect on trustworthiness assessments will have to be uncovered by further research. Also, within a profile template, different methods to visualise relevant information or techniques to mine relevant data could be applied; these in turn could influence professional trustworthiness assessments. By way of example, a topic map of current personal interests could be automatically generated, by making use of language technologies, from the files or mail messages on one's computer. Clearly, these ideas need further exploration.

Appendices

Appendices A - Literature Overview of Studies Reporting Measurements of Trust or Trustworthiness

Nr.	Reference	Nr.	Reference
1.	Rotter, 1967	31.	Muir & Moray, 1996
2.	Butler, 1991	32.	Lewicki, Bunker, & Rubin, 1995
3.	Glaeser, Laibson, Scheinkman, & Soutter, 2000	33.	McAllister, Lewicki, & Chaturvedi, 2006
4.	Feng, Lazar, & Preece, 2004	34.	Madsen & Gregor, 2000
5.	Rempel, Holmes, & Zanna, 1985	35.	Lewicki, Bunker, Kramer, & Tyler, 1996
6.	Illes, 2006	36.	Jian, Bisantz, & Drury, 2000
7.	Hoy & Tschannen-Moran, 2003	37.	EATMP, 2003a
8.	Zolin, Hinds, Fruchter, & Levitt, 2002	38.	Taylor, Shadrake, & Haugh, 1995
9.	Johnson-George & Swap, 1982	39.	EATMP, 2003b
10.	Cummings, Bromiley, Kramer, & Tyler, 1996	40.	Wrightsman, 1991
11.	Van Rozendaal, 1997	41.	Doyal & Gough, 1991
12.	Cook & Wall, 1980	42.	Sheridan, 1988
13.	Jian, Bisantz, & Drury, 1997	43.	Wheeless & Grotz (1977)
14.	Kramer, 1999		
15.	Lagace, 1991		
16.	Jeanquart-Barone, 1993		
17.	Larzelere & Huston, 1980		
18.	Yamagishi, Cook, & Watabe, 1998		
19.	McKnight, Cummings, & Chervany, 1998		
20.	Pearce, Sommer, Morris, & Frideger, 1992		
21.	Sims, Szilagyi, & Keller, 1976 reported in Galup, Saunders, Nelson & Cerveny, 1997		
22.	Rempel, Holmes, & Zanna, 1985		
23.	Mayer & Davis, 1999		
24.	Mayer, Davis, & Schoorman, 1995		
25.	McAllister, 1995		
26.	McKnight, Choudhury, & Kacmar, 2002		
27.	Jiang, et al., 2004		
28.	Gillespie, 2003		
29.	Bhattacherjee, 2002		
30.	Kanawattanachai & Yoo, 2005		

Appendix B - Conceptualisations and Definitions of the TrustWorthiness Antecedent (TWAN) Model

Cluster 'Communality': "Personal characteristics which the trustor has in common with the trustee (Abrams, Cross, Lesser & Levin, 2003; Feng et al., 2004; Illes, 2006; Levin, Cross, Abrams, & Lesser, 2002; Olson & Olson, 2000b). This can be any shared characteristic, like a similar goal they want to achieve, shared language use, common identity characteristics or shared values. Even trivial ones, like a shared hobby or the same type of pet they have, can contribute to this category." (antecedent: *common characteristic*)

Cluster 'Ability': "Capability of a trustee, determined by knowledge, skills and competences, which enables him/her to perform tasks within some specific domain (Butler, 1991; Butler & Cantrell, 1984; Mayer et al., 1995). Ability includes the extent to which a person seems:

- to recall facts, concepts, principles and procedures within certain domains (Jarvenpaa et al., 1999; McKnight et al., 2002) (antecedent: *knowledge*)
- able to act properly and with a good result while solving problems in a complex, real-life environment, using and integrating one's personal characteristics, knowledge, and skills (Cook & Wall, 1980) (antecedent: *competence*)
- to have acquired a proficiency in the execution of operations to achieve a certain goal state (Butler, 1991; Cook & Wall, 1980) (antecedent: *skills*)

Cluster 'Benevolence': "The perceived level of courtesy and positive attitude a trustee displays towards the trustor (Mayer et al., 1995). Benevolence includes the extent to which a person seems:

- to give support in situations in which it is needed (Cook & Wall, 1980; Jeanquart-Barone, 1993; Rempel et al., 1985; Van Rozendaal, 1997; Zolin et al., 2002) (antecedent: *willingness to help*)
- approachable and reachable for another person (Van Rozendaal, 1997) (antecedent: *availability*)
- not to keep sources and resources to him/herself and to give access to them to other people (Butler, 1991; Zolin et al., 2002; Rempel et al., 1985) (antecedent: *sharing*)
- to act in another person's interest and does not exploit this person when vulnerable (Rempel et al., 1985; Johnson-George & Swap, 1982; Cummings, Bromiley, Kramer & Tyler, 1996; Van Rozendaal, 1997; Cook & Wall, 1980) (antecedent: *faith in intentions*)
- interested in another person's ideas and feelings, and to listen to them and take them into account while acting (Butler, 1991; Zolin et al., 2002; Johnson-George & Swap, 1982; Cook & Wall, 1980) (antecedent: *receptivity*)
- friendly and easy to get along with (Jeanquart-Barone, 1993; Johnson-George & Swap, 1982; Van Rozendaal, 1997) (antecedent: *kindness*)
- to reveal oneself, in terms of personality and thoughts, to another person (Butler, 1991) (antecedent: *openness*)
- concerned about other people's interests (Sheppard & Sherman, 1998; Olson & Olson, 2000b) (antecedent: *caring*)
- to show dedication and engagement towards something (Jarvenpaa & Leidner, 1999; Kanawattanachai & Yoo, 2005; Zolin et al., 2004) (antecedent: *commitment*)

Cluster: 'Internalized norms': The intrinsic moral norms a trustee guards his actions with. These differ from benevolence in that they are directed towards others in general, rather than toward a specific trustor (Chopra & Wallace, 2002). Internalized norms include the extent to which a person seems:

- sincere and unable to be corrupted (Johnson-George & Swap, 1982) (antecedent: *integrity*)
- to keep sensitive information confidential (Butler, 1991) (antecedent: *discretion*)
- not to mislead or lie to others (Cummings et al., 1996) (antecedent: *honesty*)
- to treat people equally (Butler, 1991; Johnson-George & Swap, 1982; Cummings et al., 1996) (antecedent: *fairness*)
- to respect and to be true to another person (Butler, 1991; Johnson-George & Swap, 1982) (antecedent: *loyalty*)

Cluster: 'Accountability': "The degree to which a person is liable and accountable for his/her acts and meets expectations of another person. Accountability includes the extent to which a person seems:

- to follow up on any appointments and commitments made and shows adequate judgment to act in encountered situations (Butler, 1991; Zolin et al., 2002; Rempel et al., 1985; Johnson-George & Swap, 1982) (antecedent: *reliability*)
- to display consistent character traits and predictable behaviour (Butler, 1991; Rempel et al., 1985) (antecedent: *consistency*)
- to believe (s)he is able to perform a task (Castelfranchi & Falcone, 1999) (antecedent: *self-confidence*)
- stable in the intentions formed to complete a task, irrespective of difficulties encountered (Castelfranchi & Falcone, 1999) (antecedent: *persistence*)
- to accept part of the work load and to use his/her ability to accomplish a task (Zolin et al., 2002; Cummings et al., 1996; Cook & Wall, 1980) (antecedent: *responsibility*)

Appendix C - Scale and Item Measurement Properties of the TrustWorthinessANtecedents (TWAN)

Cluster and Antecedents (AT)	Origin of item	n (1164)	n (1196)	Coefficient α		Mean inter-item and corrected item-total correlations		EFA Item loading	
		S1	S2	S1	S2	S1	S2	S1	S2
Communality		1160	1188	.746	.739	.426	.417		-
I1: I trust .. because he/she shares the same interests (AT_COM_int)	6					.539	.558	.594	
I2: I trust .. because he/she shares my expec-tations and goals of the project (AT_COM_goal)	OI					.612	.586	.734	
I3: I don't trust .. because he/she has a different communication style than mine (AT_COM_com)	OI					.455	.477	.639	
I4: .. work values are not very similar to mine* (AT_COM_work)	OI					.561	.543	.606	
Ability									
Knowledge		1160	1194	.779	.801	.467	.501		
I5: I trust .. to contribute relevant expertise to this project (AT_KNOW_expert)	OI					.583	.621	.720	
I6: I trust .. to indicate the limitations of his/her know-ledge (AT_KNOW_limit)	OI					.451	.476	.600	
I7: .. is not very knowl-edgeable about his/her discipline (AT_KNOW_discip)*	25					.637	.689	.596	
I8: .. has not so much know-ledge which is relevant for the work that needs to be done (AT_KNOW_work)*	47					.677	.688	.624	
Skills		1154	1190	.865	.868	.617	.623		
I9: In his/her job .. seems to work efficiently (AT_SKIL_effic)	11, 12					.727	.713	.730	

Cluster and Antecedents (AT)	Origin of item	n (1164)	n (1196)	Coefficient α		Mean inter-item and corrected item-total correlations		EFA Item loading	
I10: I have full confidence in the skills of .. (AT_SKIL_conf)	11, 12					.725	.716	.783	
I11: .. does not perform his/her tasks with skill (AT_SKIL_perf)*	2					.724	.714	.725	
I12: I cannot rely on the task-related skills of .. (AT_SKIL_rel)*	2					.682	.735	.723	
Competence		1152	1193	.872	.851	.633	.590		
I13: .. does things competently (AT_COMP_comp)	2					.740	.681	.753	
I14: .. does things in a capable manner (AT_COMP_cap)	2					.711	.683	.717	
I15: I feel that .. is not good at what he/she does within the project (AT_COMP_good)*	25					.751	.720	.736	
I16: .. seems to be unsuccessful in the professional activities he/she undertakes (AT_COMP_unsuc)*	22, 42, 47					.711	.683	.695	
Benevolence									
Willingness to help		1159	1193	.832	.803	.560	.512		
I17: If I got into difficulties with work I know .. would try and help me out (AT_HELP_dif)	11, 12					.717	.665	.786	
I18: I can trust .. to lend me a hand if needed (AT_HELP_hand)	11, 12					.688	.677	.757	
I19: If I required help .. would not do his/her best to help me (AT_HELP_best)*	25					.563	.480	.611	
I20: I feel that I can not count on .. to help me with a crucial problem (AT_HELP_count)*	25					.694	.670	.819	

Cluster and Antecedents (AT)	Origin of item	n (1164)	n (1196)	Coefficient α		Mean inter-item and corrected item-total correlations		EFA Item loading	
Availability		1162	1191	.861	.854	.609	.596		
I21: It's usually hard for me to get in touch with .. (AT_AV_touch)*	2					.712	.693	.668	
I22: .. is available when I need him/her (AT_AV_avail)	2					.676	.663	.729	
I23: I can usually reach .. when I need him/her (AT_AV_reach)	2					.734	.707	.705	
I24: I am not able to contact readily .. when it is required (AT_AV_con)*	21					.710	.727	.716	
Sharing		1158	1192	.775	.773	.466	.461		
I25: Even if I didn't ask .. to share knowledge with me I feel certain that he/she will (AT_SHA_share)	5					.568	.549	.647	
I26: I feel that .. keeps information from me (AT_SHA_keep)*	2					.612	.613	.753	
I27: .. does not pass information or ideas on that can be helpful to you or the project team (AT_SHA_pass)*	8, 13					.510	.526	.583	
I28: .. timely shares any relevant information (AT_SHA_time)	42					.633	.620	.777	
Faith in intentions		1158	1189	.841	.816	.571	.527		
I29: I think that .. takes advantage of me (AT_FI_advant)*	10, 11					.667	.650	.705	
I30: I feel that .. takes advantage of people who are vulnerable (AT_FI_vuln)*	10, 11					.739	.696	.755	
I31: I can rely on .. to react in a positive way when I expose my weak-ness to him/her (AT_FI_weak)	5					.649	.600	.780	

Cluster and Antecedents (AT)	Origin of item	n (1164)	n (1196)	Coefficient α		Mean inter-item and corrected item-total correlations		EFA Item loading	
I32: Sound principles seems to guide the behaviour of .. (AT_FI_princ)	22, 42					.655	.608	.793	
Caring		1159	1194	.816	.800	.534	.510		
I33: If I share my problems with him/her. .. will respond constructively and caringly (AT_CA_constr)	29					.663	.667	.774	
I34: .. does not keep my interests in mind when making decisions (AT_CA_decis)*	42					.638	.600	.757	
I35: .. cares about the well-being of others (AT_CA_others)	25					.674	.636	.734	
I36: .. is primarily interested in his/her own welfare (AT_CA_own)*	16					.588	.571	.626	
Commitment		1162	1189	.834	.816	.562	.532		
I37: .. makes considerable investments in our working relationship (AT_COMIT_inv)	29					.672	.639	.778	
I38: .. is not strongly committed to the project (AT_COMIT_com)*	47					.652	.641	.688	
I39: .. does not do everything within his/her capacity to help our team perform (AT_COMIT_cap)*	37					.633	.584	.680	
I40: .. does everything what is possible in order to meet project goals (AT_COMIT_goal)	13					.708	.693	.756	
Receptivity		1157	1186	.847	.829	.582	.553		
I41: .. makes an effort to understand what I have to say (AT_REC_eff)	2					.688	.648	.723	

Cluster and Antecedents (AT)	Origin of item	n (1164)	n (1196)	Coefficient α		Mean inter-item and corrected item-total correlations		EFA Item loading	
I42: .. is sincere in his/her attempts to meet my point of view (AT_REC_sinc)	11, 12					.645	.653	.784	
I43: .. often fails to listen to what I say (AT_REC_list)*	2					.701	.665	.742	
I44: Often .. does not pay full attention to what I am trying to tell him/her (AT_REC_atten)*	14					.712	.672	.727	
Friendliness		1159	1191	.740	.723	.424	.402		
I45: If I make a mistake. .. is willing to forgive (AT_FRI_mis)	11, 14					.553	.546	.658	
I46: .. is friendly and approachable (AT_FRI_appr)	11, 15					.586	.546	.720	
I47: If .. unexpectedly laughed at something I did or said. I would wonder if he/she was being critical and unkind (AT_FRI_crit)*	9, 11					.546	.541	.604	
I48: If .. asks why a problem occurs. I will not speak freely when I am partly to blame (AT_FRI_speak)*	43					.462	.431	.554	
Openness		1158	1190	.744	.738	.496	.490		
I49: .. lets me know what's on his/her mind (AT_OPEN_mind)	2					.536	.554	.578	
I50: .. shares his/her thoughts with me (AT_OPEN_share)	2					.655	.636	.740	
I51: .. doesn't tell me what is really going on (AT_OPEN_tel)*	7					.535	.511	.753	
I52: .. is secretive (AT_OPEN_secr)*	7					**XXX**	**XXX**		

Cluster and Antecedents (AT)	Origin of item	n (1164)	n (1196)	Coefficient α		Mean inter-item and corrected item-total correlations		EFA Item loading	
Internalized norms									
Integrity		1155	1183	.810	.789	.518	.487		
I53: .. can not be corrupted (AT_INT_nocor)	OI					.640	.577	.628	
I54: .. is a corruptible person (AT_INT_cor)*	OI					.634	.595	.626	
I55: I have faith in the integrity of .. (AT_INT_fait)	7					.611	.606	.800	
I56: .. is not honest in describing his/her experience and abilities (AT_INT_hon)*	29					.629	.621	.766	
Discretion		1158	1188	.803	.805	.505	.509		
I57: If I give .. confidential information. he/she keeps it confidential (AT_DISC_conf)	2					.668	.651	.719	
I58: .. does not tell others about things if I ask that they be kept secret (AT_DISC_secr)	2					.595	.605	.620	
I59: I lack confidence in the overall discretion of .. (AT_DISC_discr)*	21					.619	.613	.728	
I60: .. talks too much about sensitive information that I give him/her (AT_DISC_sens)*	2					.587	.613	.610	
Honesty		1160	1194	.822	.810	.535	.516		
I61: I feel that .. works with us honestly (AT_HON_hon)	10, 11					.662	.666	.796	
I62: I think that .. does not mislead me (AT_HON_mis)	10, 11					.547	.523	.597	
I63: Even when .. makes excuses which sound rather likely. I am not confident that he/she is telling the truth (AT_HON_conf)*	5					.701	.692	.789	

Cluster and Antecedents (AT)	Origin of item	n (1164)	n (1196)	Coefficient α		Mean inter-item and corrected item-total correlations		EFA Item loading	
I64: Sometimes .. changes facts in order to get what he/she wants (AT_HON_fac)*	45					.676	.638	.736	
Fairness		1158	1193	.755	.757	.436	.440		
I65: .. treats me fairly (AT_FAIR_fair)	2					.628	.614	.777	
I66: .. treats me on an equal basis with others (AT_FAIR_equ)	2					.443	.441	.430	
I67: .. treats others better than he/she treats me (AT_FAIR_bett)*	2					.546	.564	.547	
I68: .. is unfair in dealings with me (AT_FAIR_unfair)*	22,42					.605	.616	.787	
Loyalty		1159	1192	.846	.843	.579	.574		
I69: I can discuss problems with .. without having the information used against me (AT_LOY_prob)	2					.718	.695	.784	
I70: .. would never intentionally misrepresent my point of view to others (AT_LOY_misp)	9, 11					.687	.668	.718	
I71: If I make a mistake. .. will use it against me (AT_LOY_mist)*	2					.726	.690	.750	
I72: If .. didn't think I had handled a certain situation very well. he/she would criticize me in front of other people (AT_LOY_crit)*	9, 11					.604	.659	.596	
Accountability									
Reliability		1159	1193	.872	.864	.642	.625		
I73: Keeping promises is a problem for .. (AT_REL_keep)*	2					.713	.701	.739	
I74: .. does things that he/she promises to do for me (AT_REL_prom)	2					.757	.750	.755	

Cluster and Antecedents (AT)	Origin of item	n (1164)	n (1196)	Coefficient α		Mean inter-item and corrected item-total correlations		EFA Item loading	
I75: If .. promised to do me a favour. he/she would follow through (AT_REL_fav)	9, 11					.746	.712	.762	
I76: I feel that .. will not keep his/her word (AT_REL_word)*	10, 11					.719	.714	.813	
Consistency		1149		.670		.334			
I77: .. behaves in a very consistent manner (AT_CONS_con)	2, 5			**X**		.498	**X**	**X**	
I78: I sometimes ignore .. because he/she is unpredictable and I fear writing or doing something which might create conflict (AT_CONS_unpr)*	5			**X**		.483	**X**	**X**	
I79: I seldom know what .. will do next (AT_CONS_nex)*	2			**X**		.511	**X**	**X**	
I80: .. responds the same way under the same conditions at different times (AT_CONS_dif)	33			**X**		.321	**X**	**X**	
Self-confidence		1161		.774		.459			
I81: .. has high self esteem (AT_SEC_est)	OI					.371	**X**	**X**	
I82: I think that .. is very self-confident (AT_SEC_conf)	OI					.649	**X**	**X**	
I83: I feel that .. is insecure of her/himself (AT_SEC_insec)*	OI					.662	**X**	**X**	
I84: .. has low self esteem (OI) (AT_SEC_lowest)*	OI					.642	**X**	**X**	
Persistence		1160	1194	.848	.837	.584	.564		
I85: Even in hard working circumstances I can count on …. to follow through on work commitments (AT_PER_com)	OI					.746	.711	.776	

Cluster and Antecedents (AT)	Origin of item	n (1164)	n (1196)	Coefficient α		Mean inter-item and corrected item-total correlations		EFA Item loading	
I86: In the face of difficulties I can count on …. to solve problems and meet work commitments in time (AT_PER_prob)	OI					.697	.687	.758	
I87: In difficult working circumstances … fails to follow through on work commitments (AT_PER_fai) *	OI					.691	.695	.729	
I88: When encountering problems … lacks the courage to constructively start working on them (AT_PER_constr)*	OI					.616	.587	.706	
Responsibility		1162	1192	.785	.785	.475	.477		
I89: I can rely on .. not to make my work more difficult by careless work (AT_RES_dif)	11, 12					.570	.583	.648	
I90: I feel that .. tries to get out of his/her work commitments (AT_RES_com)*	10, 11					.654	.650	.732	
I91: .. would go on with his/her work even if nobody checked it (AT_RES_work)	11, 12					.503	.527	.539	
I92: .. readily denies responsibility for problems incurred by his/her mistakes (AT_RES_prob)*	21					.641	.613	.795	

Note. The variation in sample size is due to the listwise exclusion of cases in case of missing values. An '*"is an indication of a negatively posed question.

Appendix D - Scale and Item Measurement Properties of the Trust Predisposition (TP), General Trustworthiness (GT) and Risk (R) Scales

Construct	Items	n		Coefficient α		Mean inter-item and corrected item-total correlations	
		S1	S2	S1	S2	S1	S2
Trust Predisposition (TP)		1159	1195	.859	.847	.491	.464
	Most people are basically honest (TP_Honest)					.729	.728
	Most people are trustworthy (TP_Trustw)					.817	.777
	Most people are basically good and kind (TP_Kind)					.671	.632
	Most people are trustful of others (TP_Trustothers)					.645	.640
	I am trustful (TP_Trustful)					.663	.656
	Most people will respond kindly when they are trusted by others (TP_Resp)					.372	.327
General Trust (GT)		1160	1192	.806	.786	.508	.478
	If I had it my way, I wouldn't let this person have any influence over issues that are important to me (GT_Infl) *					.640	.589
	I would be willing to let this person have complete control over my future on this project (GT_Contr)					.593	.562
	I really wish I had a good way to keep an eye on this person (GT_Eye) *					.561	.553
	I would be comfortable giving this person a task or problem that was critical to me, even if I could not monitor their actions (GT_Comf)					.689	.669

Risk associated with project (R)		1148	.599	.207
	The goals of this project match my personal learning goals (R_Goals)		X	.213
	I feel at risk if my team members do not perform well during the project (R_Perform)		X	.382
	It will not be a serious problem for me if this team doesn't perform well (R_Problem) *		X	.235
	I am very motivated for this project (R_Motiv)		X	.361
	I personally have a lot to loose when the team doesn't succeed (R_Loose)		X	.529
	The goals achieved in this project are personally important for me (R_Imp)		X	.345

Note. The variation in sample size is due to the listwise exclusion of cases in case of missing values. An '*"is an indication of a negatively posed question.

Appendix E - Questions in Questionnaire EVS

Personal details
- What is your gender?
- What age group are you in?

You and your team
- Did you know your team members before you collaborated with them?
- Did you use any of the following additional means of communication to collaborate with your team members during the project? If yes, mark the means you have used.

You and your team members

For the person you trusted most in your team:
- On which particular information available in your online team work environment do you base your impression of … ? Try to be as specific as possible.
- Which particular information available in your online team work environment was the most important while forming your impression of …?
- Would your current impression of … be the same if you would have met him/her in a face-to-face setting? Please explain your answer.
- Which information did you miss in order to build a reliable impression of …?

For the person you trusted least in your team:
- On which particular information available in your online team work environment do you base your impression of …? Try to be as specific as possible.
- Which particular information available in your online team work environment was the most important while forming your impression of …?
- Would your current impression of … be the same if you would have met him/her in a face-to-face setting? Please explain your answer.
- Which information did you miss in order to build a reliable impression of …?

You and your team work environment
- Would you appreciate it when the online teamwork environment contained information on your team members which reflects their behaviour? (e.g., tasks assigned to team member and their current status, last login time of team member, number of total logins) If yes, please indicate which information you would like and why you would find it useful.
- Would you allow information about your behaviour being displayed in the online collaborative teamwork environment (e.g., tasks assigned to you and their current status, last login time, number of total logins) and made available for your team members? If yes, please indicate why.
- Do you have any other tips/suggestions related to information which could be helpful to you to form an impression of your team members?

Appendix F – Interview Schema EVS

Impression of EVS team members (through time)

Within EVS you have worked with people you have never met. It was a real 'virtual team' with only text-based communication

- Did you find it difficult to form an impression of your team members in EVS? Please explain why.
- Did you miss any info in order to form an impression of your team members in EVS? If yes, please explain what info you missed.
- Did you change your impression of your EVS team members through time? If yes, on basis of what additional info and/or experiences did you change your impression?
- What info did you consider most important while forming a changed impression/to update your impression of your team member(s)?
- Would your current impression of your team members be the same if you would have met them in a face-to-face setting? Please explain why.

Role of PEXPI

- Did you have the availability of the PEXPI from the start of the project?
- Did you read the PEXPI's of your team members in EVS? If yes, when did you read the PEXPI's? (only in the beginning, throughout the project). How often did you look at the PEXPI's of your team members?
- Did you find the PEXPI useful? In what respect did you find it useful/not useful?
- What info in the PEXPI do you consider as relevant?
- What info in the PEXPI do you consider as irrelevant?
- What info in the PEXPI did you find most relevant? Why?
- What info would you like to add to the PEXPI?
- Do you think a dynamic part of the PEXPI can help to form an image of your team members? A dynamic part of a PEXPI can be seen as an information display which changes based on the behaviour of your team members, e.g., number of logins on a certain time. Please explain why a dynamic part can help/cannot help to form an image of your team members.

EVS environment in general

- Which info did you miss in the overall EVS environment to form an impression of your team members?
- Do you think an informal space (e.g., a virtual café, chitchat chatroom) could have helped your teamwork within EVS? Why?
- Do you have any other tips/suggestions related to information which could be helpful to form an impression of your team members in EVS?

Thank you very much for your collaboration!

Appendix G – Overview Interviewed Students EVS

PEXPI initially	Code name	Participated in SG
	Student 1	2
	Student 2	2
	Student 3	2
	Student 4	2
	Student 5	2
	Student 8	4
	Student 9	4
No PEXPI initially	Code name	Participated in SG
	Student 6	3
	Student 7	3
	Student 10	5
	Student 11	5
	Student 12	5
	Student 13	5
Total:	13 students	

Appendix H – Coding Scheme

Used to codify open answers in the questionnaire and answers in the interview

Source of information used for impression formation (S-INF)	
Characteristics of person (direct experience during 1st encounter)	CHARPSN
Behaviour of person (direct experience during interaction)	BEHPSN
Info from other persons within group	OP
Info derived from context/setting (by reasoning)	CONTXTINF
Most important info for impression formation	MIMP

Used to codify answers in the interview

PEXPI (PEX)	
Role of PEXPI	ROL
– Notice availability of PEXPI	– AV
– Read PEXPI	– RE
– Usefulness of PEXPI	– USE
Design of PEXPI	DES
– Relevant info in PEXPI	– REL
– Irrelevant info in PEXPI	– IREL
– Most relevant info	– MREL
– Missing info	– MIS
– Dynamic info in PEXPI	– DYN

Tips (T)	
Impression formation	IMP
EVS in general	EVS

Appendix I - Condensed Version of Questionnaire

General

1. What is your gender? (male/female)
2. What is your age? (… year)
3. Do you have experience with collaboration within a face-to-face project team within work-or study related settings? (n/y)
4. Do you have experience with collaboration within a virtual project team within work-or study related settings? (n/y)
5. Do you have experience with online conversations with people you have never met face-to-face? (n/y). (y): These conversations were primarily mediated via: text (chat, e-mail); audio conferences; videoconferences; SMS; other, namely ……
6. Did you meet someone face-to-face which you previously only knew online? (n/y) If so, was this person face-to-face very differently then you had until them imagined him/her to be? In which way(s)?

Imagine:

You recently became a member of an international virtual team within an European financed project. This virtual team collaborates independent from time, place, organization and country via a virtual project space during the lifespan of the project. Within the project you have to jointly deliver a product. You work with people from different organizations (companies, governmental and non-profit), with each of them specialized in a certain knowledge domain and with certain discipline-related skills. In order to develop a product meeting high quality standards it is important that you all integrate this specialized knowledge and use your skills. To finish this product in time you are strongly dependent on each other. For you personally the success of this project is important as well. You don't know the people you are going to collaborate with and it is not possible to meet each face-to-face within this project.

You want to form an impression of the trustworthiness of your different team members within the first two weeks of the project. Within the project this is arranged by making profile information from each team member available. You can determine yourself which information you would like to have available within these profiles.

7. Which profile information is important to form a first impression of the trustworthiness of a virtual project team member? Think of at least 15 information elements that are important for you to form this impression (open question).

Imagine:

You are in the same situation as just described. Several people have already thought about different types of information elements which could become available within a profile and have listed them. You may also determine what type of information will be made available within pre-structured profiles. All team members are asked to indicate per listed information element:

8. The importance of having this information element available in a profile to form a first impression of trustworthiness of a team member within the first two weeks of a project.

   Indicate your choice by marking: (1) Definitely not important, (2) Not important, (3) Neutral, (4) Important, (5) Definitely important (close-ended question).

9. The practical usefulness of having this information element available in a profile to collaborate in a virtual project team.

Check the box if you think this element would be practically useful (close-ended question).

Information elements listed subsequently (without descriptions provided in the original questionnaire):

Static information (116 information elements)

Title/degree	Location (private)	Zodiac	Ways I want to contribute to project	Hates … during work
Name	Location (work)	Sports and condition	Expectation of others within project	Relevant experience and skills from previous projects
Surname	Personal device/slogan	Ethnic background	Religion	Travel experience
Pseudonym/alias	Terms of employment	Personal interests (hobbies/activities)	Example cultural background and customs	Publications
Date of birth	Job status	Professional interests and activities	Language and language proficiency	Awards
Nationality	Previous work experience	Employer	Preferred language for communication within project	Media experience
Personality traits	Managerial work experience	Branch/sector	Political viewpoint	Presentation experience
Place of birth	Description education/training	Department	Philosophical viewpoint	Teach, learn, preach an useful experience
Raised in/hometown	Drivers license	Salary	Amazing experience/live event	Type of people I love
Gender	I would like to work on this part of the project…, because …	Name of function/role/position within organization	Favorite links (professional)	Worst project experience
Formal photo's	I would like to work in the following type of situation(s) ..., because …	Description of your function/role/ position	Favorite links (private)	Best project experience
Informal photo's	Professional website/homepage	Motivation for your function/role/ position	Professional references (articles)	Writing style
Length	Personal website/homepage	Ideas for project	Memberships	Correct written and oral language use
Weight	Willingness to travel for project	Personal aims	Social network (friends/connections)	Future plans
Physical stature	Contact data (work)	Career aims	Degree of relationship	Opinion on project related subjects

Eyes	Contact data (private)	Project aims	Member of a group since ..	Advertisement
Hair	Preferred medium for contact during project	Jobs finished	Expertise domain(s)	On my mind
Body art	Personal assistant/secretary	Projects finished	Motivation behind expertise domain	Favorite spot
Daily eating habits	Pets	Products finished	Recent study or work experience	Sign of special position in group (e.g., ribbon)
Smoking behavior	Situation at home	Current professional activities (next to project)	Personal tip (private)	Sign of identity verification
Drinking behavior	Relation	Current private activities	Personal tip (in relation to projects)	
Informal video	Availability during project	Expectation of project	Tip relevant (re)source for project	
Audio-message for project members	Project time capacity	Personal motivation for project	Preference of role within project	
Video-message for project members	Personal description "About me"	Reason why you are selected to participate in project	Loves … during work	

Dynamic information (38 information elements)

Number of made/changed /read/commen-ted messages/ documents (by profile owner)	Received personal rating of team members	Mean log-in duration	RSS feeds	Received reviews/ Testimonials (within team)
Number of seen/changed/ commented messages/ documents (by others)	Given personal ratings of team members	Login frequency	Percentage of profile elements filled by profile owner	Recommended by team member x, while ..
Recently made/changed /seen documents	Received references/ Testimonials (general)	Online status	Profile visit frequency by team members	
Contributions	Given references/ Testimonials (general)	Agenda/diary	Profile visit frequency by profile owner	

Received messages during the last .. days	Overview of posed questions to and answers of team members	Term frequency within content of messages/ documents	Task list with all deadlines, planned and realized tasks within project
Mean response time on messages	Overview of questions posed by and answers given to team members	Overview overlapping contacts with team members	Frequency of first, second, third authorship of article/reports
Response percentage	Local time at location of team member	Items of friends (e.g., photo's, urls)	Overlapping interests and expertise
Given ratings of messages/ contributions	Last access date and time	Shared links	Appointments made and follow up
Received ratings of messages/ contributions	Mean last access date and time	Shared references	Given reviews/ Testimonials (within team)

10. The ten most important information elements to have available in a profile to form a first impression of trustworthiness of a team member within the first two weeks of a project (open question).
11. Describe subsequently for each selected information element (open question):

- What are the facts you can derive from this information
- What is your interpretation of this information in relation to your impression of trustworthiness of your team members? What can you derive from this information leading to your trustworthiness impression?

12. Do you have any additional ideas regarding important information elements for the formation of a first impression of trustworthiness? (open question).

Appendix J - Identified Profile Template

We have summarized identified profile elements, removed overlapping elements and ordered them according to the process by which they were first identified or by type.

Profile elements common among high trust-requiring environments

Label of element	**Description of element (where applicable, from survey)**
Name	First and surname
Pseudonym[1]	Alias/display name
Photo	
Personal description/about me	Description of particulars and distinguishing characteristics of a person
Age/date of birth	
Personal weblog/homepage	Reference to a personal URL
Contact data (business/private)	For example e-mail, (mobile)phone numbers, fax, address, Skype/msn/icq/yahoo, pager
Contact method	Preferred means of contact, for example via mail, skype etc.
Location data (business/private)	Residence details (building, adress, city, province, country) during business or private hours
Occupation/function/position/role	
Company/organization/employer	
Education	Particulars and characteristics of educational programs/courses followed in relation to for the project
Interests (private/professional)	Personal interests, hobbies and activities
Language	Details on language skills, language proficiency and preferred language for regular communication (in project)
Testimonials received (references, info from others about person)	Information from a third party who previously had experience with a profile owner on his/her personal characteristics and/or performance

Profile elements identified as important to inform initial trustworthiness assessments

Label of element	Description of element (where applicable, from survey)
Personal motivation for project	
Ideas for project	Thoughts, opinions, insights and plans for project
Reason why you are selected to participate in project	
Expectation of project	
I would like to work in the following type of situation(s) ..., because …	Preference and motivation for working in specific situation(s) within the project

1 Although the element 'pseudonym' is part of the identified elements in 8 or more trust-requiring environments, it is probably less relevant in the context of a virtual project team, as most team members are known by their real name. Nevertheless, we have included this element to provide a complete overview.

I would like to work on this part of the project …, because …	Preference and motivation for working on a specific part of the project
Project aims	That which someone strives for within the project from a personal belief and ambition
Project time capacity	Number of hours someone has available for the work that needs to be done within the project
Ways I want to contribute to project	Ideas about potential personal contributions to the project
Previous work experience	List of jobs and functions held
Availability during project	Insight in availability during project, e.g., by showing regular office days/hours, planned holidays and/or planned time spans to work on the project
Personality traits	Summary of important properties and personality traits of a person
Description of relevant work experience	Particulars and characteristics of previously acquired work experience in relation to for the project indispensable competencies
Managerial work experience	Previous experience with management
Expertise	Areas someone is able and specialized in
Expectation of others within project	Anticipation on future behaviour, rules, of conduct, contributions of and interactions with team members within project
Appointments made and follow up	Overview of appointments, with whom they were made, and the status of follow up
Task list with all deadlines, planned and realized tasks within project	Overview of all tasks, deadlines and status of tasks a project member is responsible for
Preference for role within project	Preferred role with related tasks and responsibilities within the project

Practical information elements

Label of element	**Description of element (where applicable, from survey)**
Local time at location of team member	Time at the residence of a team member. Through time zones, time is dependent on location on the globe.

Appendix K – Coding Scheme Interpersonal Trust Formation

1. Antecedents of cognitive schema of professional trustworthiness (AT)

1.1 Communality (COM):	
Personal characteristics which the trustor has in common with the trustee. This can be any shared characteristic, like a similar goal they want to achieve, shared language use, common identity characteristics or shared values. Even trivial ones, like a shared hobby or the same type of pet they have, can contribute to this category.	
1.2 Ability (ABIL):	
Capability of a trustee, determined by knowledge, skills and competences, which enables to perform tasks within some specific domain. Includes the extent to which a person seems:	
knowledge (KNOW)	To recall facts, concepts, principles and procedures within certain domains
skills (SKIL)	to have acquired a proficiency in the execution of operations to achieve a certain goal state
competence (COMP)	capable to act properly and with a good result while solving problems in a complex, real-life environment, using and integrating ones personal characteristics, experience, knowledge, and skills
1.3 Benevolence (BEN):	
The perceived level of courtesy and positive attitude a trustee displays towards the trustor. Includes the extent to which a person seems:	
willingness to help (HELP)	to give support in situations in which it is needed
availability (AV)	approachable and reachable for another person
sharing (SHA)	not to keep (re) sources to him/herself and to give access to them to other people
Faith in intentions (FI)	to act in another person's interest and does not exploit this person when vulnerable
receptivity (REC)	interested in another person's ideas and feelings, listen to them and take them into account while acting
friendliness (FRI)	Friendly and easy to get along with
openness (OPEN)	to reveal oneself, in terms of personality and thoughts, to another person
caring (CA)	concerned about other people interests
commitment (COMIT)	dedicated to,motivated for and engaged with something
1.4 Internalized norms (INTNO):	
The intrinsic moral norms a trustee guards his actions with. These differ from benevolence in that they are directed towards others in general, rather than toward a specific trustor. Includes the extent to which a person seems:	
integrity (INT)	sincere and cannot be corrupted, to be true to ones personal norms and values
discretion (DISC)	to keep sensitive information confidential
honesty (HON)	not to mislead or lie to others
fairness (FAIR)	to treat people equal
loyalty (LOY)	to respect and to be true to another person

1.5 Accountability (ACC):	
The degree to which a person is liable and accountable for his/her acts and meets expectations of another person. Includes the extent to which a person seems:	
reliability (REL)	to follow up on any appointments and commitments made and shows adequate judgment to act in encountered situations
consistency (CONS)	to display consistent character traits and predictable behaviour
persistence (PER)	stable in formed intentions to complete a task, independent of difficulties encountered
responsibility (RES)	to accept part of the work load and uses his/her ability to accomplish a task
1.6 Other antecedent (OTHA):	
Any other antecedent of trustworthiness mentioned by a respondent, for example 'initiative'	

2. Mental model of trust-requiring situation (CONTXT)

2.1 Characteristics of the specific trustrequiring situation (SIT)	
risk or reward (R)	the perceived possibility of a loss or a gain as interpreted by the trustor, outside of considerations that involve the relationship with a particular trustee
dependability (DEP)	extent to which a trustor is dependent on the actions of a trustee. In working context this is mainly dependent on task structure and complexity, task and role division, domain familiarity and time pressure.
monitoring opportunities (MON)	individual behaviour monitoring and control opportunities of the trustee by the trustor
formal control (REG)	regulations/contracts/procedural norms and supervision on compliance of actual behaviour according to these formal expectations
social control (SOC)	contextual monitoring and regulation of a trustees behaviour by others than the trustor (e.g., other team members, due to group membership)
2.2 Circumstances of trustee (CIRT):	
Contextual properties that enable or disable a trustee to display the behaviour expected by a trustor.	
social embedding (SEM)	the chance that a trustor exchanges information about a trustee's performance with other trustors, thus influencing the reputation of a trustor. Trustees who know that trustors exchange information about their behaviour have an incentive to perform, even if they do not expect any future interaction with this trustor.
institutional embedding (IEM)	defection of the trustee to display trusting behaviour will have serious consequences for the trustee, who operates under institutional constraints (e.g., loss of a job)
temporal embedding (TEM)	the chance that the trustor and trustee will meet again in the future. If they have stable identities and would meet again, a trustee is keener to meet expectations, due to increased chances of reciprocity
cultural embedding (CEM)	the chance that the trustor and trustee have overlapping or conflicting culturally determinant expectations and perceptions, due to different cultural backgrounds (national, organizational, local, group membership)
other circumstances (OCIR)	all other external circumstances which are not related to specific properties of a trustee or which reasonably cannot be controlled by a trustee, for example illness, computer crashes.

3. Routes through which signs and signals are obtained (ROUT)

3.1 Routes (ROUT): The routes through which signs and signals, used as input for an attribution process, are obtained.	
direct encounter with person (DIEN)	information acquired in direct encounter(s) and first-hand experience with a person, either via personal interaction or via observation of interaction of the trustee with a third party
'word of mouth' (WOM)	information acquired via a third party (either a person or a group/organization), who had experience with the trustee. Group membership is also seen as a type of implicit 'word of mouth' information (e.g., employee of the University of Oxford).
represented information about person (REPI)	self-presented or socially constructed representation (information provided by others) of a persons identity, for example in profiles or curricula vitae etc.

4. Cognitive process of trust formation (COG)

4.1 Trustors characteristics (TCHAR)	
trust predisposition (TP)	a stable positive, neutral or negative attitude towards trust-related information independent of the situation or characteristics of a specific trustee. This predisposition will influence the trust formation process even before information about others becomes available.
mood (M)	emotional state of a trustor at a specific moment
mental models and rules (MENT)	cognitive schemata and heuristics which can influence the cognitive attribution processes, for example stereotypes, implicit personality theories, organizational and group memberships, work (task, roles, rules), discipline or culture-related schemata and heuristics. They act as a 'filter' of peoples observations and lead o individual perceptions and expectancies.

4.2 Trustors cognitive attribution process (TATR)	
direct (DIR) (using internal or external attribution of properties)	conscious, liberate and active collection and processing of information, requiring substantial mental effort, in which a trustee is considered as an unique individual with specific properties, leading to a tailor-made 'calculated' impression
internal attribution (INTB)	behaviour is attributed to the properties of a person
external attribution (EXTB)	behaviour is attributed to unfavourable circumstances and/or contextual properties of the environment in which a person is situated. A trustee is excused for not having met expectations because the trustor attributes behaviour to negative external circumstances beyond ones control.
peripheral (PERI)	subconscious, automated, collection and processing of information based on existing mental models and heuristics, leading to an intuitive and affective impression ('feeling').
habitual (HAB)	'blind' trust, without thinking: a thick and stable emotion-grounded form of trust. No additional information is evaluated, a trustor immediately displays trusting behaviour. This cognitive state is based on an extensive shared history, personal bonding and positive experience of a trustor with a trustee.

5. Manifestation of trust (MT)

5.1 Manifestations of trust (MT)	
trust state (GT)	general trust state of a trustor: a complex cognitive and emotional psychological state, comprising of positive or negative feelings towards that which is trusted and its implications for trustors' goals. A positive trust state is still no guarantee for action, because a trust state can exist without the direct necessity or opportunity to display trusting behaviour; due to circumstances a trustor might not have had the chance to act trustfully in a specific situation
trust decision (TD)	a decision to trust precedes and is a preparation for the display of trusting behaviour. A trustor weighs the possible risks and rewards against the current trust state and decides if and how (s)he will act, partly based on his or her personal threshold of risk acceptance or avoidance, and the corresponding level of their trust state
trusting behaviour (TB)	trusting behaviour is the observable (or anticipated) interaction of a trustor with a trustee, the type of behaviour displayed when the trustee is approached, following upon a positive trust decision. The behaviour of the trustor is adapted based on the impressions of a specific trustee as well as the assessment of a specific situation.

6. Other (OTH)

6.1 Other (OTH): Other types of information provided by the respondents	
general impression of trustee (GIMP)	general statement made about the trustors impression formation process of a person and characteristics of the image derived
practical function (PRAC)	information described as having a practical purpose for collaboration within a virtual project team
identification function (IDEN)	information described as having a identification purpose, to identify a person, within a virtual project team
otherwise (OTW)	any other type of information, which could not be labelled with the labels above

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Summary

The central research question of this thesis, as introduced in ***Chapter 1***, is:

> *How to inform trustworthiness assessments of virtual project team members in the initial phase of collaboration?*

There is common agreement that the availability of personal information and the possibility to interact informally at the start of a project accelerates the trust formation process. This goes for face-to-face as well as for virtual project teams. However, there is no shared understanding as to what information is critical for this acceleration and why it is so. Acceleration of the trust formation process is beneficial, as interpersonal trust is one of the key factors influencing performance in face-to-face as well as virtual teams. When little or no trust exists within a team, serious collaboration problems are bound to occur.

Virtual project teams experience more problems with interpersonal trust formation than face-to-face teams. This is likely to be due to the diminished availability of information and its computer-mediated character. Once we know what information is important for trustworthiness assessments and why it is so, we could use it for the design of measures to accelerate the formation of interpersonal trust.

To investigate the central research question we combined a theoretical (top-down) with a practical, design-oriented (bottom-up) research approach. We concluded our research with an evaluation.

1. Theoretical perspective

Chapter 2 reports the results of a literature study undertaken to gain insight in the interpersonal trust formation process, the various factors contributing to an interpersonal state and the differences between trust formation in face-to-face versus virtual project teams. It showed that perceived professional trustworthiness is an important determinant of the overall interpersonal trust state of a trustor (person who trusts someone else). It also indicated that virtual project teams lack the signs and signals needed to assess this professional trustworthiness. We therefore developed a first version of a schema for perceived professional trustworthiness, the TrustWorthinessANtecedent schema (TWAN), to provide insight in which antecedents trustors take into account while assessing the professional trustworthiness of a trustee (person who is trusted by a trustor). This schema consists of 23 hypothesized antecedents, which can be seen as general characteristics of trustworthy professionals. Examples of such antecedents are ‘communality’- the personal characteristics which the trustor has in common with the trustee; and ‘knowledge’- the extent to which a person recalls facts, concepts, principles and procedures within certain domains.

Furthermore, we discovered that virtual project team members specifically lack cues for the assessment of professional trustworthiness of a trustee. Therefore, we introduced a profile template as a method to support trustworthiness assessments in virtual project teams. This was the starting point for the design-oriented research, described in ***Chapter 4*** and ***Chapter 5***, in which the perceived user value of a profile and the relation between specific information elements and professional trustworthiness antecedents was investigated.

Starting from the TWAN schema, ***Chapter 3*** examined on which antecedents professional trustworthiness assessments are based in practice. A large number of professionals with extensive collaboration experience were canvassed on their trustworthiness assessments of two colleagues in a non-hierarchical relationship. The questionnaire was, wherever possible, based on previously used measurement items. Firstly, the scales within the questionnaire were assessed on their reliability and validity. This led to an adaptation of the TWAN schema, corresponding scales, and the questionnaire. 'Self-confidence' did not measure perceived trustworthiness and 'consistency' could not be operationalised with sufficient quality.

Subsequently, we tested to what degree the TWAN schema and a measure for Trust predisposition (a stable attitude towards trust-related information) could predict a general value for interpersonal trust (as measured with a widely accepted scale). Although all 21 remaining antecedents were used, seven antecedents proved to be most useful to assess interpersonal trust after extensive collaboration. These were the antecedents of 'communality', 'sharing', 'responsibility', 'skills', 'persistence', 'caring' and 'discretion'. Trust predisposition turned out to be less predictive than expected on the basis of previous research results, which may be due to our measuring professional trust after extensive collaboration rather than in the initial contact phase.

2. Design-oriented perspective

The case study presented in ***Chapter 4*** explored if and how virtual project team members value having a profile available to inform their trustworthiness assessments. The study also examined whether such a profile should contain static (fixed, not subject to updates) and/or dynamic (changeable, continuously updated) information elements. Information elements are 'containers' for information. Examples of information elements and corresponding information (between brackets) are 'name' (Klaas Visser), 'occupation' (plumber) and 'testimonials (references from another person)' (delivers neat work and keep one's appointments).

Results showed that a profile template with static information was especially useful to become acquainted with each other in the first two to three weeks. After this period impressions are mostly based on work-related performance, communi-

cation patterns and collaborative behaviour. If no profile was available in the initial phase, team members' impressions were grounded in whatever information was available. This finding provides evidence for the fact that people construct an impression of each other's trustworthiness irrespective of the amount and quality of the information that is available. When the profile was available on time, all members used it: they filled it in as well as read the descriptions of their team members. Team members were divided on whether to explicitly represent dynamic information in a profile (for example an indicator for the responsiveness on messages), as they derive this information themselves from context as well as interactions while collaborating.

The case study showed that a profile template can support trustworthiness assessments in the initial phase of virtual team collaboration. However, it didn't provide insight in what information elements in the profile were especially informative for these assessments. Therefore, the study described in ***Chapter 5*** inventoried information elements perceived as important by designers as well as trustors. Trustors with virtual project team experience were here asked to rate the importance of information elements for their trustworthiness assessments as well as their practical relevance for collaboration. They rated a pre-defined list with information elements. This list was composed of information elements found in the profiles within 17 trust-requiring environments, thus representative for the designers' perspective.

We expected that personal, not-work related information would on average be rated high across the group. However, the commonly preferred information elements especially referred to trustworthy characteristics in a professional context, such as a trustee's ability, motivation and availability. Several information elements that were made available by designers across all trust-requiring situations (e.g., name, photo) seem to be taken for granted by trustors, as they were not among the information elements ranked highest. Trustors labelled only a few dynamic information elements as important. Interestingly, both lists with information elements differed significantly, depending on the designers' or trustors' perspective. The elements identified as important for practical reasons overlapped to a large extent with the information elements identified by trustors as important for trustworthiness assessments. The information elements that were deemed to have practical relevance were almost all related to the availability of other people, the language used within the project, and communication methods employed to contact each other. Some elements were identified as only relevant for practical purposes, such as the 'local time at the location of a team member'. The studies reported in ***Chapter 4*** and ***Chapter 5*** resulted in a subset of the original set of information elements; all the elements in the subset helped to facilitate initial trustworthiness assessments (***Appendix J***).

3. Evaluation

Chapter 6 focused on the question which information elements trustors value particularly and whether these elements do indeed reveal relevant cues for the trust warranting characteristics of a trustee. To that end, 226 trustors were asked to select the information elements that were most important for their trustworthiness assessments at the initial stage of collaboration. The trustors were canvassed on the inferences they could derive from these elements. Their rationales were then analysed using a coding scheme based on the TWAN schema to check whether information preferences were related to the professional trustworthiness antecedents or perhaps to other concepts. Respondents predominantly valued information elements that provided them with multiple cues to the trustworthiness of a trustee, possibly indicating an 'information efficiency' strategy of trustors. Examples of such information elements are 'personality traits', 'age/date of birth' and 'work experience'. Information elements providing unique cues only could not be identified. Some additional, more personal information elements were identified as having value for professional trustworthiness assessments (for example 'photo', 'interest/hobbies' and family situation/marital status). The antecedents of professional trustworthiness that were more frequently mentioned across explanations were 'competence', 'commitment', 'responsibility', 'availability' and 'communality'. Results also indicate that not all information preferences can be explained with the cognitive schema of trustworthiness alone. For example, the appreciated information element 'photo' seemed to be selected especially because it provides trustors with a certain intuitive 'feeling' for a trustee.

Conclusion

From the results, we may conclude that providing trustors in the initial phases of collaboration with information that matches their specific cognitive needs, as further detailed in the TWAN schema, helps to inform trustworthiness assessments. A profile template is fit to ensure the provision of this information. Contrary to our expectation, we found that antecedents receive different emphases depending on the collaborative stage. In the initial phase, the antecedents 'competence', 'commitment' and 'availability' were used in particular, whereas the antecedents 'skills', 'sharing', 'persistence', 'caring' and 'discretion' influenced trustworthiness assessments only after extensive collaboration. The antecedents 'communality' and 'responsibility' were stressed at both the initial and subsequent collaborative phases. Certain information elements prove to be more informative for professional trustworthiness assessments at the initial phase of collaboration, as they provide multiple cues for the trustworthiness antecedents especially relevant in this phase.

Samenvatting

De centrale onderzoeksvraag van dit proefschrift, zoals geïntroduceerd in Hoofdstuk 1, is:

Hoe kunnen we leden van virtuele projectteams helpen de betrouwbaarheid van hun collega's in te schatten in de eerste fase van samenwerking?

Over het algemeen wordt aangenomen dat de beschikbaarheid van persoonlijke informatie en de mogelijkheid tot informele gesprekken aan het begin van een project de opbouw van vertrouwen versnelt. Dit geldt zowel voor face-to-face teams als voor virtuele projectteams. Er is echter geen overeenstemming over welke informatie noodzakelijk is voor een versnelde opbouw van vertrouwen en waarom deze informatie zou bijdragen tot versnelling. Het is nuttig de opbouw van wederzijds persoonlijk vertrouwen te bevorderen, omdat vertrouwen één van de kernfactoren is die de prestatie van zowel face-to-face als virtuele teams bevordert. Als er weinig of geen vertrouwen is binnen een team, is er een verhoogde kans op aanzienlijke samenwerkingsproblemen.

Virtuele projectteams ervaren doorgaans meer problemen met de opbouw van vertrouwen dan face-to-face teams. Dit komt waarschijnlijk door de beperkte beschikbaarheid van informatie en het computergemedieerde karakter van deze informatie. Als we weten welke informatie belangrijk is voor het inschatten van betrouwbaarheid en waarom die belangrijk is, dan kunnen we deze kennis gebruiken voor het ontwerp van interventies die de opbouw van vertrouwen versnellen.

Voor het onderzoeken van de centrale onderzoeksvraag hebben we een theoretische onderzoeksaanpak (top-down) gecombineerd met een praktische, meer ontwerp-gerichte (bottom-up) onderzoeksaanpak. Tot slot hebben we een evaluatie gedaan.

1. Theoretisch perspectief

Hoofdstuk 2 rapporteert de resultaten van een literatuuronderzoek dat is bedoeld om inzicht te krijgen in de groei van vertrouwen, de verschillende factoren die bijdragen aan een bepaalde staat van vertrouwen en de verschillen tussen vertrouwensgroei in face-to-face en virtuele project teams. De waargenomen professionele betrouwbaarheid bleek in belangrijke mate het vertrouwen van een trustor (persoon die iemand anders vertrouwt) te bepalen. Ook bleek dat het virtuele projectteams ontbreekt aan de tekens en signalen om de professionele betrouwbaarheid van iemand in te schatten.

Om inzicht te krijgen in de antecedenten van de professionele betrouwbaarheid van een trustee (persoon die door de trustor wordt vertrouwd), hebben we een schema

voor de waargenomen professionele betrouwbaarheid ontwikkeld, het TWAN-schema (TrustWorthinessANtecedent-schema). Dit schema bestaat uit 23 veronderstelde antecedenten die als algemene eigenschappen van betrouwbare professionals worden gezien. Voorbeelden van dergelijke antecedenten zijn 'gemeenschappelijkheid'- de persoonlijke eigenschappen die de trustor met een trustee deelt; en 'kennis'- de mate waarin een persoon feiten, ideeën, principes en procedures binnen bepaalde inhoudelijke domeinen beheerst.
Daarnaast bleek dat virtuele projectteamleden aanwijzingen voor de inschatting van de professionele betrouwbaarheid van een trustee missen. Daartoe introduceerden we een modelprofiel als methode om inschattingen van elkaars betrouwbaarheid in virtuele projectteams te ondersteunen. Dit was meteen het begin voor het ontwerpgerichte deel van het onderzoek, beschreven in Hoofdstuk 4 en Hoofdstuk 5. Daarin hebben we de gebruikerswaardering van een profiel en de relatie tussen bepaalde informatie-elementen in een profiel en de antecedenten van professionele betrouwbaarheid onderzocht.

Uitgaande van het TWAN-schema, zijn we in Hoofdstuk 3 nagegaan op basis van welke antecedenten professionele betrouwbaarheid in de praktijk wordt geschat. Een groot aantal professionals met langdurige ervaring in samenwerken met anderen werd naar hun betrouwbaarheidsinschattingen van twee collega's in een gelijkwaardige positie gevraagd. De vragenlijst hergebruikte, waar mogelijk, eerder opgestelde vragen voor het meten van betrouwbaarheid. Ten eerste werden de schalen van deze vragenlijst getest op hun betrouwbaarheid en validiteit. Dit leidde tot een aanpassing van het TWAN-schema, de bijbehorende schalen en de vragenlijst. Het antecedent 'zelfvertrouwen' bleek geen betrouwbaarheid te meten en 'consistentie' kon niet met voldoende kwaliteit worden geoperationaliseerd.
Vervolgens hebben we getest in welke mate het TWAN-schema en een maat voor de basishouding voor vertrouwen van mensen (een stabiele houding ten opzichte van vertrouwensgerelateerde informatie) een algemene waarde voor wederzijds vertrouwen kon voorspellen. Hoewel alle 21 overgebleven antecedenten door professionals werden gebruikt voor hun inschatting, bleken zeven daarvan het beste het wederzijds vertrouwen na langdurige samenwerking te voorspellen. Dit waren de antecedenten 'gemeenschappelijkheid', 'delen', 'verantwoordelijkheid', 'vaardigheid', 'doorzettingsvermogen', 'zorgzaamheid' en 'discretie'. De basishouding van vertrouwen bleek minder voorspellend dan was verwacht op basis van eerder onderzoek. Dit is misschien eraan toe te schrijven dat in dat onderzoek professioneel vertrouwen gemeten is na een langdurige in plaats van in een beginnende samenwerking.

2. Ontwerp perspectief

De casestudy in Hoofdstuk 4 verkende of en zo ja, hoe virtuele projectteamleden de beschikbaarheid van een profiel waardeerden als ondersteuning van hun betrouwbaarheidsinschattingen. Deze studie bekeek ook of een dergelijk profiel statische (onveranderlijke) en/of dynamische (veranderlijke, continue herziene) informatie zou moeten bevatten. Informatie-elementen zijn 'containers' voor informatie. Voorbeelden van informatie-elementen en daarbij horende informatie (tussen haakjes) zijn 'naam'(Klaas Visser), 'beroep'(loodgieter) en 'verklaring (referenties van derden)'(levert prima werk en komt afspraken na).

Uit de resultaten bleek dat een modelprofiel met statische informatie vooral nuttig was om elkaar te leren kennen in de eerste twee tot drie weken. Na deze periode werd de indruk vooral gebaseerd op werkgerelateerde prestaties, communicatiepatronen en samenwerkingsgedrag. Als er geen profiel beschikbaar was in deze eerste fase, baseerden teamleden hun indruk op om het even welke beschikbare informatie. Deze bevinding ondersteunt het idee dat mensen zich een indruk van elkaars betrouwbaarheid vormen, onafhankelijk van de hoeveelheid en de kwaliteit van de beschikbare informatie. Als het modelprofiel op tijd beschikbaar was, gebruikten alle teamleden het: ze vulden het in en lazen ook de beschrijvingen van hun teamleden. De meningen van teamleden waren verdeeld over het wel of niet presenteren van dynamische informatie in een profiel (bijvoorbeeld een indicator voor de antwoordsnelheid op berichten), aangezien ze deze informatie zelf bleken af te leiden uit zowel de context als de interacties tijdens de samenwerking.

De case study toonde aan dat een modelprofiel inschattingen van iemands betrouwbaarheid die zijn gedaan tijdens de eerste fase van samenwerking in virtuele teams kan ondersteunen. Maar dit gaf nog geen inzicht in welke specifieke informatie-elementen nu informatief zijn voor dit type inschattingen. Daarom werd in de studie in Hoofdstuk 5 geïnventariseerd welke informatie-elementen door ontwerpers en welke door trustors als belangrijk worden gezien. Trustors met ervaring in virtuele projectteams werden in deze studie gevraagd om te scoren in welke mate informatie-elementen van belang waren voor de inschatting van betrouwbaarheid en voor praktische ondersteuning van de samenwerking. Zij scoorden een voorgedefinieerde lijst met informatie-elementen. Deze lijst bevatte alle informatie-elementen die werden gevonden in de profielen in 17 vertrouwen vereisende, online omgevingen die het perspectief van de ontwerper representeerden.

We verwachtten dat persoonlijke, niet-werkgerelateerde informatie gemiddeld hoog zou scoren binnen de groep. Echter, de algemeen hoogst gewaardeerde informatie-elementen verwezen vooral naar betrouwbare eigenschappen in een professionele omgeving, zoals de bekwaamheid, motivatie en beschikbaarheid van een

trustee. Een aantal informatie-elementen dat door ontwerpers over alle vertrouwen vereisende online omgevingen beschikbaar was gemaakt (bijvoorbeeld naam, foto) leken door trustors als vanzelfsprekend aanwezig te worden beschouwd. Ze bevonden zich namelijk niet onder de algemeen hoogst gescoorde informatie-elementen. Trustors vonden maar een paar dynamische informatie-elementen belangrijk. Interessant genoeg bleken beide lijsten met informatie-elementen behoorlijk te verschillen, afhankelijk van het perspectief van ontwerper of trustor. De elementen die als praktisch relevant werden gescoord, refereerden vooral aan de beschikbaarheid van anderen, de gebruikte taal binnen het project en de gebruikte methoden om met elkaar in contact te komen. Sommige elementen werden alleen als praktisch relevant aangewezen, zoals de 'locale tijd op de standplaats van een teamlid'. De studies in Hoofdstuk 4 en Hoofdstuk 5 leidden tot een subset van de originele verzameling informatie-elementen; alle elementen in deze subset ondersteunen initiële betrouwbaarheidsinschattingen (Appendix J).

3. Evaluatie

Hoofdstuk 6 richtte zich op de vraag welke informatie-elementen trustors vooral waarderen en of deze elementen inderdaad bepaalde relevante aanwijzingen voor de betrouwbaarheid van trustees onthullen. Hiervoor werden 226 proefpersonen gevraagd om de informatie-elementen te selecteren die zij het belangrijkste vonden voor inschattingen van professionele betrouwbaarheid in de eerste fase van samenwerking. De respondenten werden gevraagd op te schrijven welke karakteristieken van de trustee zij afleidden van deze elementen. Hun verklaringen werden met behulp van een coderingschema, afgeleid van het TWAN-schema, geanalyseerd om na te gaan of de voorkeur voor bepaalde informatie kon worden gerelateerd aan de antecedenten van professionele betrouwbaarheid of aan andere concepten. Deelnemers gaven de voorkeur aan informatie-elementen die hen meerdere aanwijzingen over de betrouwbaarheid van een trustee gaven, hetgeen op een 'informatie-efficiëntie'-strategie van trustors kan duiden. Voorbeelden van dergelijke informatie-elementen zijn 'persoonlijkheidskenmerken', 'leeftijd/geboortedatum' en 'werkervaring'. Er zijn geen informatie-elementen gevonden die unieke aanwijzingen voor de betrouwbaarheid van iemand geven. De antecedenten van professionele betrouwbaarheid die het meest werden genoemd waren 'bekwaamheid', 'betrokkenheid', 'verantwoordelijkheid', 'beschikbaarheid' en 'gemeenschappelijkheid'. Resultaten geven ook aan dat niet alle informatievoorkeuren alleen aan de hand van het cognitieve schema voor vertrouwenswaardigheid verklaard kunnen worden.

Conclusie

Uit de resultaten van de diverse onderzoekingen kunnen we concluderen dat het beschikbaar maken van informatie tijdens de eerste fase van samenwerking, passend bij de specifieke cognitieve behoeften zoals uitgewerkt in het TWAN-schema, helpt bij het vormen van een betrouwbaarheidsinschatting. Een modelprofiel helpt om dit type informatie beschikbaar te maken. Anders dan we verwacht hadden, vonden we dat verschillende antecedenten van betrouwbaarheid een verschillende nadruk krijgen, afhankelijk van de fase van samenwerking. In de beginfase gebruikt men vooral de antecedenten 'bekwaamheid', 'betrokkenheid' en 'beschikbaarheid', terwijl de antecedenten 'vaardigheden', doorzettingsvermogen', 'zorgzaamheid' en 'discretie' betrouwbaarheidsinschattingen na de eerste drie weken beïnvloeden. De antecedenten 'gemeenschappelijkheid' en 'verantwoordelijkheid' blijven in het begin en tijdens latere samenwerkingsfasen van belang. Bepaalde informatie-elementen blijken meer informatief voor betrouwbaarheidsinschattingen in de beginfase van de samenwerking, aangezien zij meerdere aanwijzingen bevatten voor de antecedenten van betrouwbaarheid die in deze fase van belang zijn.

Dankwoord

Dankwoord

'Trust builds relationships. Relationships build people.' (Duane Hodgin)

Een proefschrift schrijven is een hele onderneming. Net zoals bij de start van een onderneming lukt het niet alleen. Er zijn heel wat mensen die er zowel direct als indirect aan hebben bijgedragen dat dit boekje nu voor u ligt. Met hun vertrouwen en ieder op hun eigen manier hielpen zij om ideeën te laten groeien en concreet uit te werken. Zonder helaas volledig te kunnen zijn, wil ik een aantal van hen hier noemen.

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Een prettige werkomgeving helpt bij de combinatie van projectwerk met een proefschrift. Ik kon bouwen op de brede ervaring van en mét collega's uit projecten binnen het Learning Network programma en CELSTEC, maar ook bij de andere organisatieonderdelen van de OU en binnen EU-projecten. Collega's met wie ik in de afgelopen jaren met veel plezier samen heb mogen werken en waarvan ik veel heb geleerd. Met wie ik broodjes heb gegeten, heb gewandeld en gelachen en die interesse toonden. Zonder iedereen te noemen, die lijst zou lang zijn en ik zou vast iemand vergeten, wil ik jullie allen hartelijk danken voor de prettige samenwerking. Ik hoop dat de cultuur van collegialiteit en open deuren in de toekomst blijft bestaan en verder wordt verbreed.

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Curriculum Vitae

Ellen Rusman is educational technologist and assistant professor within the Research and Technology Development Programme on Learning Networks at the Centre for Learning Sciences and Technologies (CELSTEC) of the Open Universiteit, the Netherlands.

She was born on the 19th of July, 1975, in Alkmaar, the Netherlands. She holds a Msc. in Educational Science and Technology at the University of Twente, with a focus on curriculum development and implementation. During her study she spent several months at the Centre for Studies in Advanced Learning Technology (C-SALT) at Lancaster University, United Kingdom. In her master thesis she researched culture-related (educational) obstacles experienced by students at ITC, an international educational institute for Geographic Information Systems (GIS).

After her graduation in 1998 she started as educational technologist at CELSTEC. She has been an educational designer, trainer and consultant since, collaborating as project member and leader in local, national and international (EU) projects. She designs environments for (collaborative) learning, information and knowledge management. She participated in several European projects, such as Cooper, E-Len, LTfLL and CEFcult. In 2000 she explored various countries during a sabbatical of one year.

At the end of 2006 she started to combine her work as an educational designer with PhD research. Her main area of research interest includes the support of collaborative learn and work experiences in blended networked environments. She is specifically interested in the influence of trust and trustworthiness perceptions on collaboration, as well as on cultural influences on these perceptions. She sees the concept of learning networks as one of the instruments usable within knowledge management as well as lifelong learning initiatives.

More information and a list of her publications can be found at:
http://www.open.ou.nl/eru/

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Promotores: Prof.dr. W.M.P. van der Aalst (TUE), Prof.dr. K. Wolf (University of Rostock)
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Ghazanfar Farooq Siddiqui (VU)
Integrative modeling of emotions in virtual agents
Promotores: Prof.dr. J. Treur (VU)
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Peter van Kranenburg (UU)
A Computational Approach to Content-Based Retrieval of Folk Song Melodies
Promotores: Prof.dr. R.C. Veltkamp (UU), Prof.dr. L.P. Grijp (UU, Meertens Instituut)
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Pieter Bellekens (TUE)
An Approach towards Context-sensitive and User-adapted Access to Heterogeneous Data Sources, Illustrated in the Television Domain
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Promotor: Prof.dr. M. Papazoglou (UvT)
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e3alignment: Exploring Inter-Organizational Business-ICT Alignment
Promotores:Prof.dr. J.M. Akkermans (VU)
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Co-promotor:Dr. A. Wombacher (UT)
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Jahn-Takeshi Saito (UM)
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Co-promotor:Dr. ir. J.W.H.M. Uiterwijk (UM), Dr. M.H.M. Winands (UM)
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Bouke Huurnink (UVA)
Search in Audiovisual Broadcast Archives
Promotores:Prof.dr. M. de Rijke (UvA), Prof.dr.ir A.W.M. Smeulders (UvA)
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Alia Khairia Amin (CWI)
Understanding and supporting information seeking tasks in multiple sources
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Peter-Paul van Maanen (VU)
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Promotores: Prof.dr. J. Treur (VU)
Copromotor: Dr. T. Bosse (VU) Promotie: 09 December 2010

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Edgar Meij (UVA)
Combining Concepts and Language Models for Information Access
Promotor: Prof.dr. M. de Rijke (UvA)
Promotie: 10 December 2010

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Rasa Jurgelenaite (RUN)
Symmetric Causal Independence Models
Promotor: Prof.dr. T.M. Heskes (RUN)
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Willem Robert van Hage (VU)
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Promotor: Prof.dr. G. Schreiber (VU)
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Hans Stol (UvT)
A Framework for Evidence-based Policy Making Using IT
Promotor: Prof.dr. H.J. Van den Herik (UvT)
Promotie: 21 January 2009

2009-04
Josephine Nabukenya (RUN)
Improving the Quality of Organisational Policy Making using Collaboration Engineering
Promotores: Prof. dr. E. Proper (RUN), Prof. dr. ir. G.- J. de Vreede, University of Nebraska at Omaha, USA
Copromotor: Dr. P. van Bommel (RUN)
Promotie: 03 March 2009

2009-05
Sietse Overbeek (RUN)
Bridging Supply and Demand for Knowledge Intensive Tasks - Based on Knowledge, Cognition, and Quality
Promotor: Prof. dr. E. Proper (RUN)
Promotie: 24 April 2009

2009-06
Muhammad Subianto (UU)
Understanding Classification
Promotor: Prof.dr.A.P.J.M. Siebes (UU)
Promotie: 14 January 2009

2009-07
Ronald Poppe (UT)
Discriminative Vision-Based Recovery and Recognition of Human Motion
Promotor: Prof. dr. ir. A. Nijholt (UT)
Copromotor: Dr. M. Poel (UT)
Promotie: 02 April 2009

2009-08
Volker Nannen (VU)
Evolutionary Agent-Based Policy Analysis in Dynamic Environments
Promotores: Prof.dr. J. van den Bergh (VU), Prof.dr. A.E. Eiben (VU)
Promotie: 16 April 2009

2009-09
Benjamin Kanagwa (RUN)
Design, Discovery and Construction of Service-oriented Systems
Promotor: Prof. dr. ir. Th. van der Weide (RUN)
Promotie: 21 April 2009

2009-10
Jan Wielemaker (UVA)
Logic programming for knowledge-intensive interactive applications
Promotores: Prof. dr. B.J. Wielinga (UvA), Prof. dr. A.Th. Schreiber (VU)
Promotie: 12 June 2009

2009-11
Alexander Boer (UVA)
Legal Theory, Sources of Law & the Semantic Web
Promotor: Prof. dr. T. M. van Engers (UVA)
Copromotores: Prof. dr. J. A. P. J. Breuker (UVA), Dr. R. G. F. Winkels (UVA)
Promotie: 25 June 2009

2009-12
Peter Massuthe (TUE, Humboldt-Universitaet zu Berlin)
Operating Guidelines for Services
Promotores:Prof.dr. Kees van Hee (TUE), prof.dr. Wolfgang Reisig (Humboldt-Universitaet zu Berlin)
Copromotor;prof.dr. Karsten Wolf (Universitaet Rostock)
Promotie: 21 April 2009

2009-13
Steven de Jong (UM)
Fairness in Multi-Agent Systems
Promotor: Prof. dr. H.J. van den Herik (UvT), Prof.dr. E.O. Postma (UvT)
Copromotor: Dr. K. Tuyls (TUE)
Promotie: 04 June 2009

2009-14
Maksym Korotkiy (VU)
From ontology-enabled services to service-enabled ontologies (making ontologies work in e-science with ONTO-SOA)
Promotores:Prof.dr. J. Top (VU)
Promotie: 18 June 2009

2009-15
Rinke Hoekstra (UVA)
Ontology Representation - Design Patterns and Ontologies that Make Sense
Promotor: Prof.dr. J.A.P.J. Breuker (UVA)
Copromotores: Prof.dr. T.M. van Engers (UVA), Dr. R.G.F. Winkels (UVA)
Promotie: 18 September 2009

2009-16
Fritz Reul (UvT)
New Architectures in Computer Chess
Promotor: Prof.dr. H.J. van den Herik (UvT)
Copromotor: Dr. J.W.H.M. Uiterwijk (UM)
Promotie: 17 June 2009

2009-17
Laurens van der Maaten (UvT)
Feature Extraction from Visual Data
Promotores: Prof.dr. E.O.Postma (UvT), Prof.dr. H.J. van den Herik (UvT)
Copromotor: Dr. A.G. Lange (RACM)
Promotie: 23 June 2009

2009-18
Fabian Groffen (CWI)
Armada, An Evolving Database System
Promotor: Prof. dr. M.L. Kersten (CWI/UvA)
Copromotor: Dr. S. Manegold (CWI)
Promotie: 10 June 2009

2009-19
Valentin Robu (CWI)
Modeling Preferences, Strategic Reasoning and Collaboration in Agent-Mediated Electronic Markets
Promotor: Prof.dr. H. La Poutre (CWI/TUE)
Promotie: 02 July 2009

2009-20
Bob van der Vecht (UU)
Adjustable Autonomy: Controling Influences on Decision Making
Promotor: Prof.dr. J.-J. Ch. Meyer (UU)
Copromotor: Dr. F.Dignum (UU)
Promotie: 06 July 2009

2009-21
Stijn Vanderlooy(UM)
Ranking and Reliable Classification
Promotor: Prof.dr. H.J. van den Herik (UvT), Prof.dr. Th.A. de Roos (UM), Prof.dr.rer.nat. E. Hüllermeier, Philipps-University of Marburg, Germany
Promotie: 01 July 2009

2009-22
Pavel Serdyukov (UT)
Search For Expertise: Going beyond direct evidence
Promotor: Prof.dr. P.M.G. Apers (UT)
Copromotor: Dr. D. Hiemstra (UT)
Promotie: 24 June 2009

2009-23
Peter Hofgesang (VU)
Modelling Web Usage in a Changing Environment
Promotor: Prof.dr. A.E. Eiben (VU)
Copromotor: Dr. W. Kowalczyk (VU)
Promotie: 08 October 2009

2009-24
Annerieke Heuvelink (VU)
Cognitive Models for Training Simulations
Promotor: Prof. dr. J. Treur (VU)
Copromotor: Dr. K. van den Bosch (TNO), Dr. M. C. A. Klein (VU)
Promotie: 11 September 2009

2009-25
Alex van Ballegooij (CWI)
"RAM: Array Database Management through Relational Mapping"
Promotor: Prof. dr. M.L. Kersten (CWI/UvA))
Copromotor: Prof. dr. A.P. de Vries (TUD)
Promotie: 17 September 2009

2009-26
Fernando Koch (UU)
An Agent-Based Model for the Development of Intelligent Mobile Services
Promotores: Prof. Dr. J.-J. Ch. Meyer (UU), Prof. Dr. E. Sonenberg (University of Melbourne)
Copromotor: Dr. F. Dignum (UU)
Promotie: 05 October 2009

2009-27
Christian Glahn (OU)
Contextual Support of social Engagement and Reflection on the Web
Promotores: Prof. dr. E.J.R. Koper (OU), Prof.dr. M. Specht (OU)
Promotie: 18 September 2009

2009-28
Sander Evers (UT)
Sensor Data Management with Probabilistic Models
Promotores:Prof.dr.ir. P.M.G. Apers (UT)
Copromotor:Prof.dr. L. Feng, Tsinghua University (China).
Promotie: 25 September 2009

2009-29
Stanislav Pokraev (UT)
Model-Driven Semantic Integration of Service-Oriented Applications
Promotor: Prof. dr. ir. R. J. Wieringa (UT)
Co-promotor: Prof. dr. M. Reichert (University of Ulm) Assistent promotor: Dr. ir. M. W. A. Steen (Novay) Promotie: 22 Oktober 2009

2009-30
Marcin Zukowski (CWI)
Balancing vectorized query execution with bandwidth-optimized storage
Promotor: Prof. dr. M.L. Kersten (CWI/UvA)
Copromotor: Dr. P.A. Boncz (CWI)
Promotie: 11 September 2009

2009-31
Sofiya Katrenko (UVA)
A Closer Look at Learning Relations from Text
Promotor: Prof. dr. P.W. Adriaans (UVA)
Promotie: 10 September 2009

2009-32
Rik Farenhorst (VU) and Remco de Boer (VU)
Architectural Knowledge Management: Supporting Architects and Auditors
Promotor: Prof. dr. J.C. van Vliet (VU)
Copromotor: Dr. P. Lago (VU)
Promotie: 05 October 2009

2009-33
Khiet Truong (UT)
How Does Real Affect Affect Affect Recognition In Speech?
Promotor:Prof. dr. F.M.G. de Jong (UT), Prof. dr. ir. D.A. van Leeuwen (RU)
Promotie: 27 August 2009

2009-34
Inge van de Weerd (UU)
Advancing in Software Product Management: An Incremental Method Engineering Approach
Promotor: Prof.dr. S. Brinkkemper (UU)
Copromotor: Dr. ir. J. Versendaal (UU)
Promotie: 09 September 2009

2009-35
Wouter Koelewijn (UL)
Privacy en Politiegegevens; Over geautomatiseerde normatieve informatie-uitwisseling
Promotores: Prof. dr. H.J. van den Herik (UvT/UL), Prof. mr. A.H.J. Schmidt (UL)
Co-promotor: dr. L. Mommers (UL) Promotie: 04 November 2009

2009-36
Marco Kalz (OU)
Placement Support for Learners in Learning Networks
Promotor: Prof.dr. E.J.R. Koper (OU)
Copromotor: Dr. J.M. van Bruggen (OU)
Promotie: 16 October 2009

2009-37
Hendrik Drachsler (OU)
Navigation Support for Learners in Informal Learning Networks
Promotores: Prof.dr. E.J.R. Koper (OU)
Co-promotor: Dr. H.G.K. Hummel (OU) Promotie: 16 October 2009

2009-38
Riina Vuorikari (OU)
Tags and self-organisation: a metadata ecology for learning resources in a multilingual context
Promotor: Prof.dr. E.J.R. Koper (OU)
Promotie: 13 November 2009

2009-39
Christian Stahl (TUE, Humboldt-Universitaet zu Berlin)
Service Substitution -- A Behavioral Approach Based on Petri Nets
Promotores: Prof.dr. K. van Hee (TUE), Prof.dr. W. Reisig (Humboldt-Universitaet zu Berlin)
Co-promotor: Prof.dr. Karsten Wolf (Universitaet Rostock)
Promotie: 1 December 2009

2009-40
Stephan Raaijmakers (UvT)
Multinomial Language Learning: Investigations into the Geometry of Language
Promotores: Prof. dr. W. Daelemans (UvT), Prof.dr. A.P.J. van den Bosch (UvT)
Promotie: 1 December 2009

2009-41
Igor Berezhnyy (UvT)
Digital Analysis of Paintings
Promotores: Prof. dr. E.O. Postma (UvT), Prof.dr. H.J. van den Herik (UvT)
Promotie: 7 December 2009

2009-42
Toine Bogers (UvT)
Recommender Systems for Social Bookmarking
Promotor: Prof.dr. A.P.J. van den Bosch (UvT)
Promotie: 8 December 2009

2009-43
Virginia Nunes Leal Franqueira (UT)
Finding Multi-step Attacks in Computer Networks using Heuristic Search and Mobile Ambients
Promotor: Prof. dr. R.J. Wieringa (UT)
Co-promotor: Dr. P. van Eck (UT)
Promotie:13 November 2009

2009-44
Roberto Santana Tapia (UT)
Assessing Business-IT Alignment in Networked Organizations
Promotor: Prof. dr. R.J. Wieringa (UT)
Promotie: 4 December 2009

2009-45
Jilles Vreeken (UU)
Making Pattern Mining Useful
Promotor: Prof. dr.A.P.J.M. Siebes (UU)
Promotie:15 December 2009

2009-46
Loredana Afanasiev (UvA)
Querying XML: Benchmarks and Recursion
Promotor: Prof.dr. M. de Rijke (UvA)
Co-promotor: Dr. M.J. Marx (UvA)
Promotie: 18 December 2009

A general proposition is that interpersonal trust in virtual project teams only comes through face-to-face meetings, as these meetings allow spontaneous communication essential to get to know each other. However, as plausible as this proposition seems, it is unknown what information is exchanged that is so important to get to know each other, to assess each others' trustworthiness and thereby to build trust. Consequently, it remains unknown whether other methods than a face-to-face meeting could be used to exchange information supportive for interpersonal trust formation.

This thesis explores which perceived trust-warranting properties of a colleague (called trustworthiness antecedents) are generally considered for professional trustworthiness assessments. Information that is most informative for these assessments, at the first stage of collaboration, is identified. To present this information, a profile template is introduced as a suitable alternative method to inform initial professional trustworthiness assessments in virtual project teams.
To effectively inform these assessments, this profile template should contain certain information elements which provide information for more than one professional trustworthiness antecedent.

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